

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Rail Patterns.\*

BY A. L. HOLLEY.

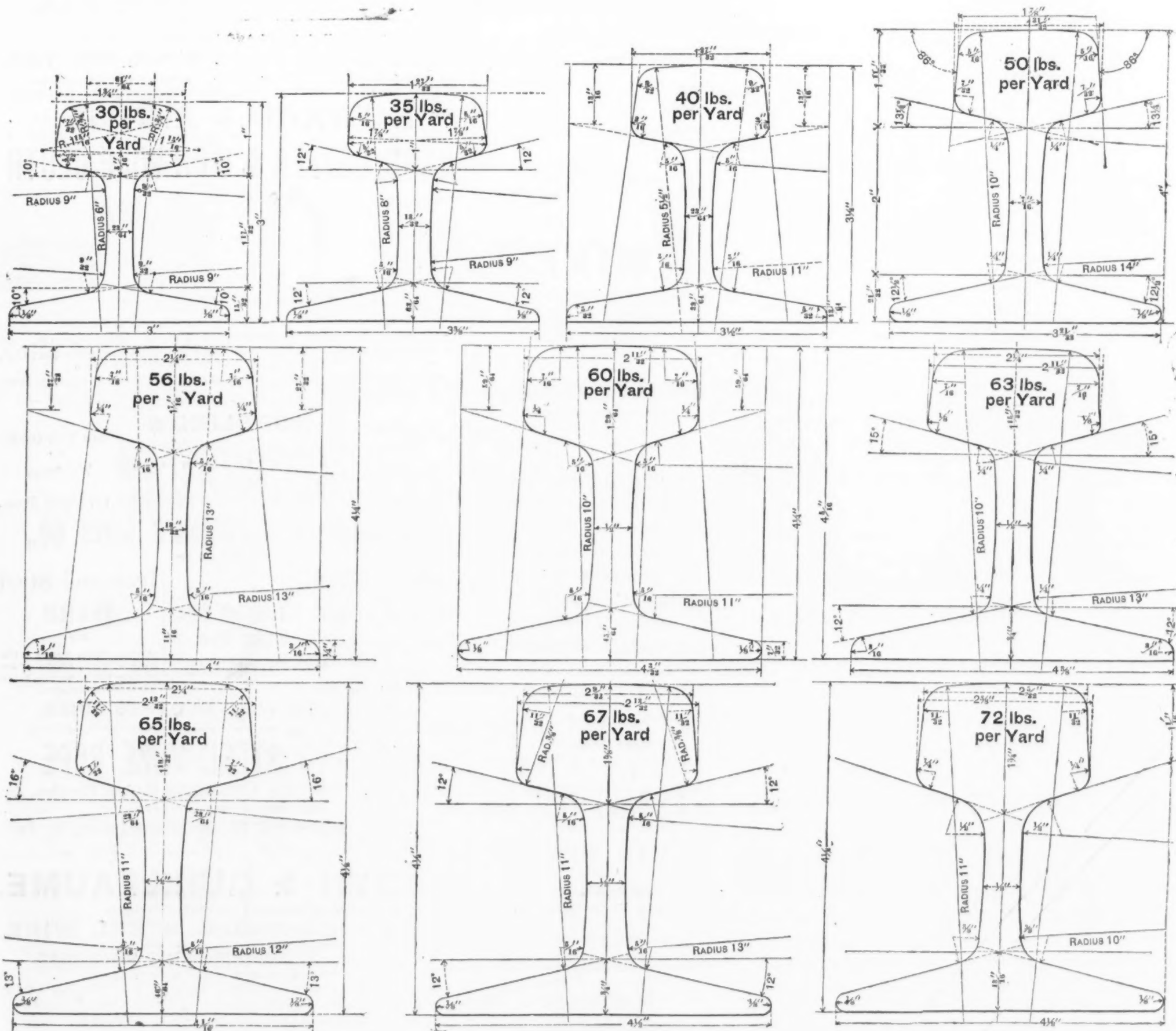
There are regularly manufactured in the 11 Bessemer steel rail mills of the United States 119 patterns of steel rails, of 27 different weights per yard. This list does not include patterns which, although still largely in use, are regarded by experts as obsolete, and which would swell the number to nearly 300; nor does it include all the pat-

tern, on Sunday, without loss of time; but the great majority of orders are not for 2000 tons; they are more often for 500 tons and sometimes for 100 tons. One mill had to change rolls as many as four times a week, for some months, and I presume this is not an unusual experience. Were each of the 11 mills obliged to change rolls and patterns only once during the week, not including Sunday changes, they would together lose, at the reasonable profit of \$5 per ton on rails, and allowing the usual stoppages for repairs, above \$30,000 per year.

head, which was not designed until 1874. Sixty-four per cent. of the 119 patterns are embraced under five weights per yard. Three only of these vary from standard type. There are thus left 76 patterns, all of them modern and standard, to represent five different weights, for which five patterns would perfectly answer. Of the 60-pound rails, there is only one of the pear-head type, while a dozen of the beveled-head templates cannot be distinguished from each other, except by laying them together, and yet no less than 30 patterns are in current

Second.—The cost to railways companies of multiplying patterns is far more serious, chiefly in one direction—it prevents rail makers from keeping standard rails in stock. If rail makers could roll and stock standard patterns when special orders were slack, they could prevent the excessive rise in prices which the scarcity of rails from time to time creates. It cannot be denied, after the unvarying experiences, that many railway managers do not buy largely when rails are cheap; they put off and put off ordering their full supplies, hoping for lower rates, until

their cost was about \$232,000, or nearly 19 times as much as it would have been for the maximum requirement of 10 patterns. But this does not give an adequate idea of the expense of multiplying patterns. New sections are constantly brought out by railway companies, and, as most of the 119 are recent, it is safe to suppose that this process of multiplication would naturally go on. Again, each of the mills rolls many of the same patterns, sometimes for the same roads. It is not probable that all the mills will be called on to roll all the patterns, but



HOLLEY'S STANDARD SECTIONS FOR STEEL RAILS.

terns for which rolls are kept on hand to fill a possible demand; nor does it include patterns rolled in one finishing groove by opening or closing the rolls, so as to get different weights with the same contours. The list embraces only those separate patterns which are subject to current orders. How thoroughly modern these patterns are, is shown by the fact that of the whole 119, there are but five patterns of conspicuously old shape; all the rest more or less completely illustrate the standard features—a heavy head, light web and flanges and a good angle to hold the fish plate. Sixty-two per cent. of the patterns have the "Chanute"

use for the 60-pound weight, which is obviously 29 patterns too many. The object of this paper is, first, to show that while this multiplication of rail patterns is an annoyance and an expense to rail makers, it is a source of immense loss to railway companies; second, to review the suggestions of experiment and practice regarding the shape of steel rails, and to suggest a method for the adoption of the few standard patterns which are necessary.

First.—The cost of a set of three-high finishing rolls for steel rails, with guides and guards fitted, averages about \$1500. The number of sets of rolls in use at the 11 mills to produce the 119 patterns—several mills making the same patterns—is 133, and

it is not improbable, if this system continues, that each mill will be called on to roll a large number of them. One of the mills already rolls 20, another 25 and three of them roll 31 each of the 119 modern patterns. If the mills average even 30 patterns each, the 330 sets of rolls required will have cost half a million of money.

The cost of changing rolls is a much more serious expense than the cost of rolls. The time of changing rolls varies in different mills, but it probably averages about 2½ hours, or the time required to roll say 35 tons of rails. The number of changes made also varies very much. Rolls that do a fair week's work, say, 2000 tons, without dressing, may be replaced by rolls of another

The looking after and keeping up so many patterns of rolls, and the innumerable varieties of drilling and slotting, involve extra men and expense; but they are chiefly deprecated by rail makers as an annoyance, rather than as a direct expense. With all the care that must be taken in large organizations, mistakes and misunderstandings about them will constantly arise between makers and users, when each customer wants a different rail, different variations in standard lengths, different percentages of short rails, different sized fish holes, different pitch of fish holes, different patterns of fish plates, different lengths of fish plates, different slotting, different bolts, different tests, different everything.

the necessities of the track can be postponed no longer. Just at this time a hundred other roads are in the same condition—they are all pinched together—and off they all rush to the rail mills to get first served, and up go the prices of rails \$40 or \$50 per ton.

The difference between the average minimum and the average maximum prices of rails, on the books of one steel company, was \$43.50 per ton in 9 months. It is probable that 200,000 tons of rails could have been added to the product of the 11 Bessemer steel mills during the year prior to the rapid rise in prices. When the railway companies did buy the 200,000 tons, they paid an advance of \$30 to \$40 per ton. If these rails had been in stock when the demand

\* A paper read before the American Institute of Mining Engineers.



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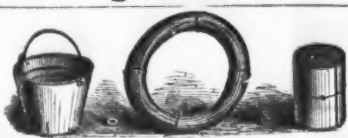
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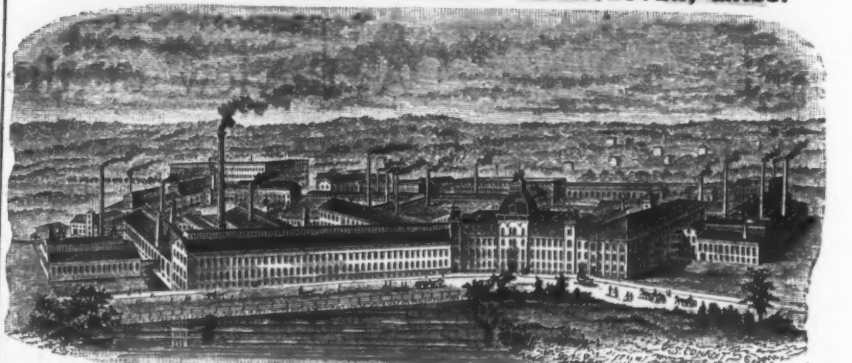
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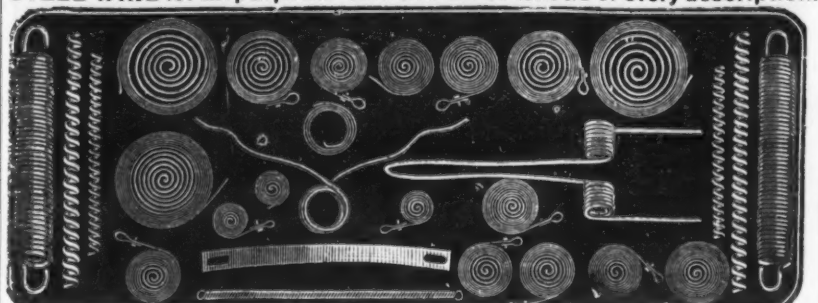
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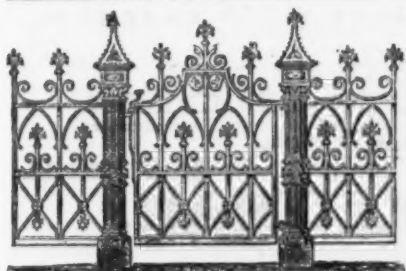
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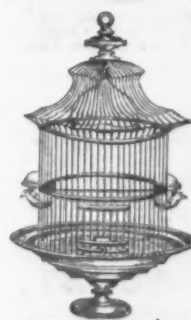
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came, the simultaneous wants of a large number of roads could have been met without much increasing the price. Supposing the price to have been only \$10 less than the average high rate, the saving to railway companies would have realized the respectable sum of \$2,000,000. And the rail makers would have been better off too, because they would have got fair prices for their whole product. High prices at one end of the year did not compensate for the excessively low prices at the other end, because when rails were dear, pig iron and labor were equally dear.

The argument is not that stocking standard rails will always make them cheap. Their value, like that of all products, changes with the general condition of trade. Rail makers would rather produce, even without profit, for a few months in the year, than to lose their good men and break up their smooth working organizations. Stocking standard rails would enable them both to produce cheaply and to sell at a fair price. It would, therefore, check excessive fall as well as excessive rise in prices.

The argument is: 1. That running mills on half or three-quarter time, or letting them stand for one year, and the next year filling them with orders for short delivery far in excess of their capacity, is simply a waste that railway companies have to pay for in the long run. No fact regarding the iron manufacture is better established than this—that regularity in working and gradual increase of capacity, rather than sudden fluctuations, are to the advantage of all concerned. Running a 100,000-ton mill at a 70,000-ton rate does not create nor save any money, however much it may temporarily bring down prices. On the contrary, it wastes the time of the men, it wastes fuel, it wastes machinery, it wastes capital; and for all this waste, neither the railway, nor the steel maker, nor the workman, nor anybody has saved anything, or got anything more to show, than they would have got out of a fire or an earthquake.

2. Excessive production is also wasteful: it strains both men and plant, and it does not allow time for repairs just when they are needed. The wear and tear of loose joints and connections in machinery increase—not uniformly, but at least at the square of the time they are allowed to run without repair. The same rule holds in the preliminary industries of making pig and mining ore. Excessive output is wasteful, and a large decrease of output, either by working short turns or by standing, is particularly wasteful of the time of men and the use of the plant. All the men and all the plant must be used, and in so far as they are not fully used, their capacity is simply wasted. For all this railway companies have to pay in the long run. Any temporary cheapness of rails must be compensated. They cannot and will not be produced for long periods without a fair profit, nor is it to the interest of a railway or of a community that any industry should be prosecuted without fair profits.

3. Besides the waste due to these fluctuations of output, railway companies have to pay for maintaining a system by which they cannot get rails when they want them. Of course, rail makers will work first for those who pay most, and high rates for immediate accommodation fix the general price for months to come. Rail makers would gladly stock standard rails, just as wheel makers stock standard wheels, if they could be sure that the rails were standard, and could be sold just as readily as those made to special order. As we have observed, this would save them trouble and anxiety, as well as loss, and it would enable them to keep their organizations and plants in economical working order, so as to produce at the minimum cost. There is still another consideration. On account of the sudden scramble for rails, due largely to there being no stock to draw from, 150,000 tons or more per year have to be imported at the then ruling high prices. American rail makers would have gladly made these rails during slack times; as it is, American mill owners and American workmen have now lost them altogether, and the railway companies have paid extravagant prices.

Third.—The question now arises: How is the difficulty to be remedied? The answer involves a review of the causes.

1. The early steel rails were naturally made to the existing iron patterns. These were generally pear headed, in order to prevent the sides of the head from breaking down, and were therefore not adapted to fishing. When the quite different physical character and behavior of steel became known—first of the hard steels and then of the modern rail steels—many and necessarily diverse attempts were made to adapt the shape of the rail to the new and varying material. Some of the attempts were scientific, and their general results were similar, but the exact patterns largely differed. On the contrary, some railway companies, utterly disregarding the accumulating knowledge of steel, stuck to the old pear head; and as grooves for rolling iron have too much draft for steel, new rolls had to be made for old patterns, thus still further aggravating the difficulty. Finally, in 1874, Mr. Chanute, of the Erie road, started a really scientific investigation to determine the shape and proportions for steel rails. This we will consider further on.

2. There is another cause of the multiplication of patterns, more potent and more difficult to remedy than any intrinsic cause. It is the egotism of certain engineers and officers of railways. I do not refer to those honestly differing opinions which are founded on observation, even if that observation is incomplete and one-sided. I refer to the determination of certain persons who dictate patterns to railways—and these persons are not a few—to use no pattern that any other manager has invented, but to vary from all standard patterns, for no reason whatever except to inflict their own individuality upon some feature of the interest confided to their care. I cannot, of course, give names and particulars in a public paper; but there are plenty of names and instances known to rail makers and to dealers and to the railway fraternity. There are instances of men signaling their accession to power by the imposition of a rail pattern which is not only new, but inferior in every way to patterns in current use.

Some of these tinkers think they win the admiration of boards of directors by thus showing up the general ignorance and their own technical genius. They fondly believe that having Stiggins' rail pattern talked over in the mills and railroad offices gives them a certain immortality. It does.

3. There is another cause of multiform rails, which is just as absurd as the last named. I give a typical instance—a case in which, I am sorry to say, I personally figured, for I had to design the rail for a steel-making client. A railway manager wanted a better head on his otherwise fair rail, but he insisted that it must fit his standard fish-plate. No standard rail would fit his fish-plate, although several suited him in other respects. Nothing would do but a brand new pattern, and it is now one of the 119. This railway company is to be congratulated. It will have saved, during the period of a dozen years, perhaps a hundred dollars worth of special joint fastenings at each end of long sections of replaced track, and where an occasional bad rail is replaced before the general renewal.

The following practical questions are first in order: What are the proper proportions for steel rails? How were they determined? Who is the authority? The art is now so far advanced that we can answer these questions. The proportions and even the contours are those adopted in 62 per cent. of the 119 standard patterns; they were determined by experiment and practice, and the authority is the majority of railway managers and all the scientific experts. These proportions and contours are illustrated by the ten patterns in the engravings.

It must be constantly borne in mind that the experience in iron rails is no criterion for steel, because modern rail steel, including the soft steel made on Dr. Dudley's formula, is a comparatively uniform product, varying less than other large classes, such as tool steel and even boiler plate steel. Rail iron, on the contrary, especially those just preceding the steel era, could not be classed under one species, if indeed they were of the same genus. They included every possible mixture of metalloids, slag and iron, from the rotten conglomerate that crushed under a light traffic when piled into the 84-pound, 4-inch rail made for the Buffalo, Corning and New York Railroad prior to 1853, to the old Reading 45-pound rail of reworked merchant bar, and nearly as homogeneous and durable as steel. It is not surprising that iron rail patterns were various, when nearly every lot purchased had its particular manner of going to pieces. One railroad superintendent could guess as well as another at a pattern that wouldn't stand; scientific inquiry had not got around to the rail business.

Let us examine the steel rail pattern in detail.

1. A few years' use of steel abundantly proved that the sides of the head do not break down, even if quite thin. The only normal mechanical destruction is the wearing out. The occasional mashing of the ends, and the very rare splitting and crushing of the rail elsewhere, are due to the bad casting of ingots, and to working spongy ingot tops into rails. The breaking of rails which are properly laid is due to chemical defects. The strength of steel thus rendered it practicable to cut out the under side of the head, leaving a nearly flat table to hold a fish plate, and so to sustain and preserve the ends of the rail.

2. The next point was to decrease the normal destruction by wear. Breaking down did not occur, and lamination could not occur in the product of a fusion process. The first and very obvious suggestion was to put as much metal as possible into the head, without robbing the web and flange and impairing the rail as a beam. These points will be considered further on.

Having as much metal as possible in the head, what proportions and shape endure best, reference also being had to the wear of the rolling stock? A wide head theoretically reduces the pressure per square inch of the wheels. But on account of the slight coning of the wheels it has been observed that their actual footprints are only three-quarters to 1 inch wide, while those wheel-treads which are worn hollow do not take a full bearing on a wide head. If the head is wide it must be thin with a given weight of rail, so that its side presents less surface, and hence a higher rate of flange wear and a greater variation in the gauge of the track. The head must be wide enough to give ample bearing to the fish plates; otherwise they are soon worn to such shape that they cannot be kept tight. Exactly the best width of head for a given weight of rail can hardly be determined, but the experience of a decade has convinced experts generally that for 56 to 70 pound rails it lies between 2 1/4 and 2 1/2 inches. Rail designers have, therefore, respectively adopted every possible fraction of this undetermined quarter of an inch.

The exact contour of the head is very important. In 1874 Mr. Chanute, chief engineer and general superintendent of the New York, Lake Erie and Western, then the Erie Railway, observed that rail heads rounded to a small radius wore the wheels out of their normal shape, at the junction of the flange and the tread, into a more nearly right-angular shape, which was obviously less strong and less safe. It was also obvious to him, as it now is to everybody, that the greatest wearing surface, and hence the least rate of wear, would be secured by giving the side of the head such a shape originally as the wheel would give it by wear. Mr. Chanute then made a large number of templates of worn rails and of worn tires and wheels. From all of these templates Mr. Chanute took a mean line, which he adopted as the shape of the head. Another advantage of this shape is that with a given weight of metal it widens the fish-plate bearing. As we have observed, the Chanute head has been generally adopted, although with slightly varying angles, of course, for 62 per cent. of the 119 standard rails.

3. The width and shape of the head having been provided for, how much metal can be spared from the web and flange to deepen it, and how shall the remaining metal be disposed? The rail is now to be considered as a beam, and as a bearing to transfer the

See Colburn & Holley's European Railways, plates 12 and 13 1/2.



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exact proportions which are better than any  
others, because the conditions of use vary  
almost infinitely; but so nearly the best  
form for average use has been determined  
by practice, that no one can prove it not to  
be the best.

**I. The web and base of the rail have been**  
pared down to meet the conditions of the  
beam, until further reduction would impair  
their safety. It fell to me to point out, in a  
discussion of this subject before the Society  
of Civil Engineers, that permanent ruptur-  
ing strains would be left in a rail of which  
the flange was so thin that it came out of  
the finishing groove at a little higher tem-  
perature than "black hot," while its heavy  
head finished at a bright red. Engineers  
generally who were starting on excessively  
thin flanges, thickened them to meet this cir-  
cumstance of manufacture. The minimum  
thickness of the edge of the flange for rails  
above 56 pounds is ¼ inch; the thickness of  
the flange where it joins the stem is from  
¾ to 1 inch, or that which will give an  
angle for the fish plate of about 12°. The  
reason of this will be further considered.

**The width of base must be so great that the**  
rail will not turn over and will not cut into  
the sleepers. Mr. Sandberg's rule for sleepers  
3 feet apart centers, is to make the width  
and height the same, except that in the lighter  
sections the proportion of height is increased.  
In the best American practice, with sleepers  
2 feet apart centers, the base and height of  
rails are usually the same. A 4-inch base  
with 4½ inch height, is the largest deviation  
from this rule. The 6½-inch base of the  
4½-inch rail of the Metropolitan Railway in  
London, is a singular departure in the other  
direction.

**II. The web of the steel rail has been**  
pared down until it runs, in the twenty-two  
56-lb. patterns, from 13 to 20-32ds, and in  
the thirty 60-lb. patterns, from 7 to 10-16ths  
of an inch. But no web of any of the current  
patterns has broken down from being too  
thin. Whether or not a 64th should be added  
or removed no man can say; nor is the  
question of farther variation of any im-  
portance, except to the immortals before  
mentioned.

**III. The foregoing proportions having**  
been settled, the question is: How much of  
the remaining metal shall go into height of  
web, and how much into thickness of head?  
To perfect the rail as a beam, so much of it  
should go into the web as to at least double  
the standard height, because the stiffness of  
the beam increases as the cube of the height.  
But it has been ascertained that, with the  
best existing type of roadbed, 5½-inch rails  
wore out more rapidly than 4-inch rails of  
the same quality. The reason is obvious.  
The higher rails were too rigid; the lower  
rails yielded slightly under the load. Dr.  
Dudley graphically describes wear as the  
breaking or mashing of the infinitesimal  
teeth which form the surface of the rail.  
We may regard the wheel as a projectile  
which breaks and mashes these teeth. Its  
destructive effect is as the square of  
its velocity; the elasticity of the rail  
increases the time of impact and  
so decreases the power of the blow.

**As the tread of the rail becomes a more**  
and more perfect plane by means of better man-  
ufacture and roadbed, the stiffness of the  
rail may be increased, and no doubt will be  
increased, to carry heavier loads per wheel.  
With good ballast of the present type, and  
sleepers 2 feet apart centers, it has been  
found that a well-proportioned rail of about  
4½ inches height will carry the present loads  
of 5 or 6 tons per driving-wheel to the best  
advantage. The Great Western U-rail,  
still used, is the worst form for stiffness.  
The rule for spacing sleepers in a country  
where they are comparatively cheap, is to  
leave just as little space between them as  
will allow the convenient tamping of ballast.

**There is great convenience in the even num-**  
ber, 2 feet, and it cannot be proved that it is  
not as good as 2 feet and a quarter of an  
inch, which some rail tinkers would, no  
doubt, have specified if it had occurred to  
him. Iron and steel sleepers, so largely  
used in Germany and elsewhere, and espe-  
cially the longitudinal system, will, no doubt,  
modify our permanent way in all depart-  
ments at a not distant day, but we shall have  
time to enjoy any improvement of our  
present system.

**Having thus determined all the propor-**  
tions except the thickness of the head, we  
find that rails of 60 to 72 pounds per yard  
may have heads of 1½ to 1½ inch mean  
thickness, which will last, under average  
traffic, until new conditions of roadbed,  
load and manufacture shall have indicated  
further improvements in the weight and  
proportions of steel rails. It probably would  
not pay, considering the interest account  
and probable improvements, to secure longer  
wearing capacity, except in rails for speci-  
ally severe service.

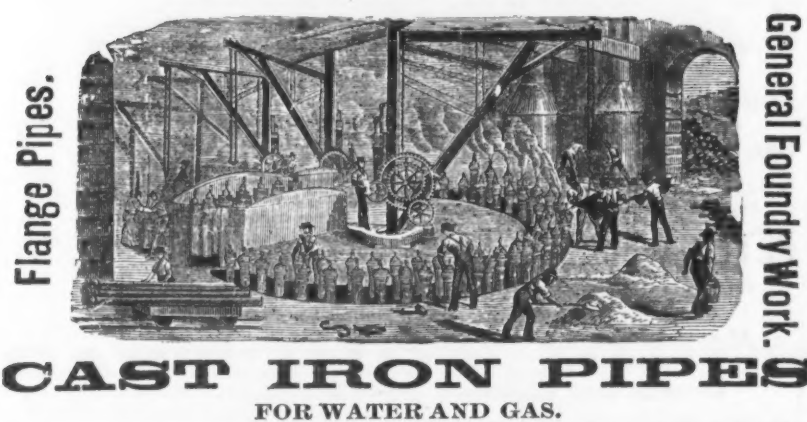
**IV. What determines the angle of the**  
under side of the head to hold the fish  
plate? If the plate could bear against hori-  
zontal surfaces it would not be forced out  
laterally by the load; but it could not be  
properly fitted by rolling; its play would  
rapidly increase and could not be taken up.  
Mr. Chanute experimented in this direction  
also, and found that with angles above 15  
the plate was loosened by the stretching of  
the bolts; this relieved the pressure and  
friction of the plate against the nuts, and  
allowed them to turn. He therefore adopted  
the angle of 15° under the head. To avoid  
unnecessary metal in the flange, he made its  
angle 12°, which can hardly be put on wrong  
side up; the difference in the top and bottom  
slopes can do no harm. Mr. Sandberg  
specifies 11° at both top and bottom, for  
heavy rails, and 15° for light rails. The 81-  
pound Midland bull-head steel rail is an ex-  
ample of very bad shape for fishing; the gen-  
eral slope is too great, and the surfaces are  
differently curved, so that no plate would fit  
or wear well.

**Speaking of the angle fish plate, a good**  
specimen of which is shown with Mr. Sand-  
berg's 60-pound rail, while recent inventors  
of this excellent device are disputing about  
their priority, I call your attention to an en-  
graving in Colburn & Holley's "European  
Railways," published in 1853, and entitled  
"58-pound rail with Adams bracket joint." This  
form of fish plate was invented by the  
late Wm. Brydges Adams, of London, about



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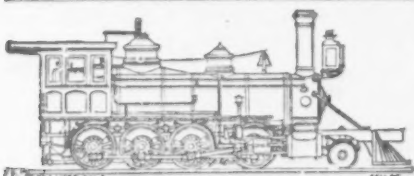
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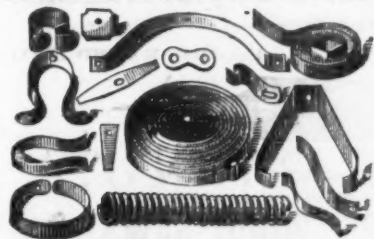
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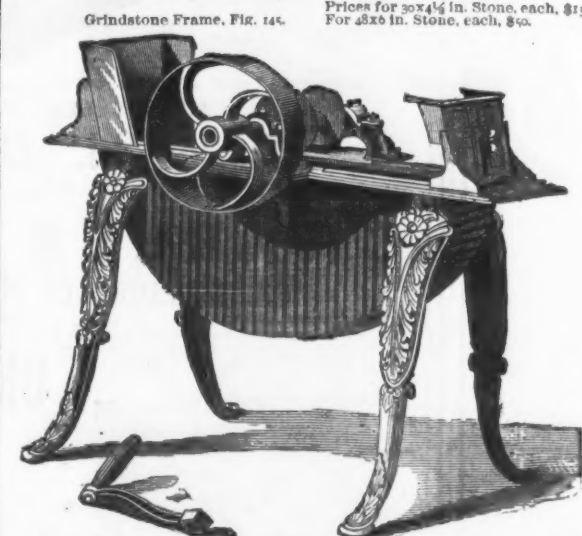
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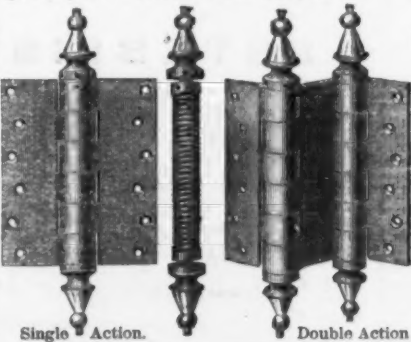


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30 years ago; and I also venture to remark that I designed the rail shown with it 24 years ago. It rather differs from the patterns current at the time. It was intended to be made of the best reheated soft iron, which, with thin and hence elastic heads, has been proved to break down least and to wear best. The flange was made a little thick, so that it could be rolled out of tough red-short iron.

Fourth.—Having thus observed that the proportions and contours of the majority of the standard patterns were determined by scientific methods, and that no new departure was necessary in the present state of the art, we are confronted with the final question—how are 60 or 70 patterns of rails, all of them illustrating the established principles, to be reduced to the few patterns which, by universal adoption, each for its own character of service, will enable the great economies we have considered to be realized? The reform is certainly not to begin by making a new set of patterns. Better roadbeds, steel sleepers, heavier wheel-loads and improved adaptations of steel, will determine new patterns in due time.

For the present needs of all concerned, the obviously reasonable, and the only practicable solution, is for railway companies to fix on the—say 10 patterns—each of different weight, from about 30 to 70 pounds, which most completely embody the settled principles of steel rail proportions, with reference, also, to the extent to which such patterns have already been adopted. For instance, it would not be reasonable to ask the many companies who have adopted the most used and good 60-pound pattern shown to inaugurate reform by changing to a better pattern. No railway company which has a good pattern likes to change; each insists that it has as much right as another to perpetuate its own patterns. In so far as railway managers treat the subject on these narrow grounds, no reform can come; or, to put it plainly, they save at the spigot but waste at the bung.

Guided by the principles we have considered, I venture to suggest the 10 patterns shown by the engravings, and selected out of the 119 current patterns, as standards for steel rails. I have thought it best not to complicate the matter by stating who designed these rails, or who rolls them or who uses them. These facts can be found out by those who need them. The only important facts are that these patterns, on the average, embody more nearly the established principles, and are more largely used, than any other set of 10 modern patterns.

No expert whom I have consulted in the matter thinks 10 patterns too few; some say that the 60 pound, between the 60 and the 72 pounds, is enough, and that the 63 and 65 are unnecessary. The 63 and 65 are, however, largely used, and I am sure that steel makers will not object to stocking rails of 10 patterns, as far as may be necessary, if railway companies will only agree on them.

To start the reform, if a considerable number of companies who use, say, a 57 to 61-pound rail, or whose traffic a 60-pound rail would suit, would agree on a good 60-pound pattern which is most used; if they would only agree to adopt it, say, for two years' orders, rail makers could and would gradually begin stocking this standard rail when orders were slack, in the certainty of selling it at a fair price when any of these roads might want rails. Rail makers would take the risk of changes, as under such a system changes would be made, not by capricious individuals, but by a convention of experts; and they would be foreshadowed by discussion and consultation. The system once inaugurated would be tested; attention would be drawn to its advantages, and it would inevitably become general.

The cost and trouble of changing the pattern of steel rails is not so very formidable, when closely considered, in view of one fact—steel rails wear so uniformly, under similar conditions, that long sections of track can be renewed at a time, thus requiring but few special fastenings where the pattern changes. With iron rails, especially those bought at the lowest price, the difficulty would be very largely increased.

Fifth.—It may be said that uniformity in patterns is just as necessary for iron rails, which are still largely used and to be used. If the best iron rails are used, there would be little difficulty in determining standard patterns; but the best iron rails will cost more than steel rails. I do not feel equal to the consideration of those varieties of iron rails which are laid by speculators just to get a road running and its securities unloaded.

Sixth.—Rail fastenings would also have to be uniform, to a certain extent, for each pattern. Rail makers could not stock unfinished rails, and then get them all back into the mill for drilling and slotting, thus interrupting current work. Fish plates of all types may be used so long as their bearings fit the standard rail.

The foregoing considerations about uniform rail patterns apply equally to fish plates, and need not be repeated. The present diversity of patterns is perfectly unnecessary and wasteful. It should at least appear that the size and pitch of fish-bolt holes might be agreed upon, and yet they differ to a degree which is ridiculous. In 21 patterns of rails made at one mill, there are 6 different diameters of hole (from 3/4 to 1 1/16 inches); there are 10 different distances apart of holes (from 4 to 6 inches); and there are 14 different distances of the first hole from the end of the rail (2 1/4 to 3 15/16 inches); for one pattern the distance is 2 13/64 inches. To think that the mind of man can hit perfection in fish jointing within the 64th of an inch is almost appalling. It would be impossible within the limits of this paper to fully discuss rail fastenings. It should be obvious to every one that the angle plate has every advantage over the plain splice, as a means of holding up the rail vertically and laterally, and especially as a means of preventing the creeping of rails without starting fractures in them by nicking their flanges. It seems proper in this connection to recognize Mr. Sandberg's important contributions to good permanent way during the last 20 years, by means of careful experiment and observation, and by means of a system of inspection which is its theory and in its difficult administration.

tion, is fair to both the makers and the users of rails.

In conclusion, let us very briefly review the ground we have traversed. No expert will deny, I think, that about 10 weights of rail will just as perfectly meet the requirements of railways as the 27 weights which are now standard, and that some one pattern of any given weight is better than many patterns; for instance, than the 29 other standard 60 pound patterns. The multiplication of patterns is a source of expense and trouble to rail makers, in getting up new rolls and in delays while changing rolls. But it is a source of far greater expense to railway companies, chiefly by the preventing the stocking of standard rails, which would check fluctuations in prices and prevent excessive prices. Fluctuation in output also wastes capital, plant and time, for all of which railway companies must pay in the long run.

There are two principal causes of the multiplication of rail patterns. The first was the natural result of adopting for steel the patterns of iron rails, which provided for every variety of defectiveness peculiar to iron, and of adopting patterns to the various grades of steel until a standard grade was determined. The other cause is the unreasonable egotism and the narrow and trifling considerations of certain railway officials. Other railway officers, however, have in a scientific manner determined the proper proportions and contours for steel rails, and they have determined exact patterns, which are so nearly correct that they cannot be proved to be incorrect. The majority of railway companies have adopted the proportions and contours, but the patterns are still very numerous. The obvious way to reduce the existing many to the few necessary patterns, is to adopt for each of the necessary weights that existing pattern which most nearly conforms to the principles which have been established, and with reference also to the extent of its present use. The patterns shown in the engraving are proposed as possibly the best that can be selected. Rail fastenings must be uniform to a certain extent, but this reformation does not present serious difficulties. Meanwhile, improved roadbed, heavier wheel weights and new adaptations of steel will provide the elements for improved rail patterns, and these will be devised in a scientific manner by that class of railway managers which has so largely improved the forms of steel rails.

**A New Form of Punch for Iron Plates.**

At the regular weekly meeting of the Polytechnic Association of the American Institute, March 10, Mr. T. D. Stetson, in the chair, the subject of punching iron plates and the construction of boilers was taken up for the general discussion of the evening.

Mr. Samuel H. Jenkins, of New York, read a paper upon a new form of punch which he had invented, and the results which were obtained by its use. The ordinary punch in making a 3/4-inch hole leaves it 1/4 at the bottom in ordinary boiler plate. The effects of this were graphically illustrated upon the blackboard by drawings of fair, good and bad boiler work. It is, of course, always desirable to put the small ends of all punched holes together, but even with the most careful management it is found that only about one-third of a boiler can be made by turning the sheets over so as to accomplish this. The attempt to force rivets to fit tapered holes results in weakness of the work. "I venture to say that fully 75 per cent. of all our boiler explosions, as well as the breaking in two of many iron ships, may be traced as a result of this kind of construction. In proof of this, I will pass around some samples of rivets taken from what our English cousins claim to be a piece of first-class workmanship, the steamship Anchor, of the Anchor line. While she was on the dry dock for repairs after her famous collision with the Queen, I visited her and obtained these rivets."

The speaker then showed a large number of rivets, which were in every case badly crippled by having been driven in holes which did not match, and which had been partially forced into line by the drift-phen. The tapering form of hole in several cases apparently aggravated the evil of bad spacing.

The new style of punch which was shown was intended to give a clean parallel-sided hole in an ordinary punching press, by means of a punch. The new tool consists of a punch, which, for ordinary boiler work, is 1/4 inch smaller than the finished hole is to be. A short distance from the face of the punch there is a projection, or what may be described as a cutting shoulder, which reams or shears the hole out to the finished size. The face, or cutting edge, of this portion of the punch has a wavy profile. It is depressed on opposite sides of the punch, and raised above a horizontal line between these depressions. In this way it begins its cut on opposite sides, and by the time that the punch is through the plate, the gullets of the upper part are just beginning to cut. The hole made is very close to size, smooth, and does not buckle or spring the plate. If the ordinary punch is made to fit closely and punch a smooth and tolerably cylindrical hole, the plate is so sprung as to require a great deal of hammer work to make it true.

With holes made by the new punch test samples have shown considerably greater strength than either punched or drilled holes. The speaker then stated that the only reason he could see for the superiority over drilled work, was the fact that the punch left the iron in a more compact state about the holes. The following are the figures: Strain required to shear sample with old-style punched holes, 38,820 pounds; sample with drilled holes, 39,210 pounds; sample with holes punched by the new punch, 39,850 pounds. Each sample was riveted on a machine, and each was supposed to be good work of its class.

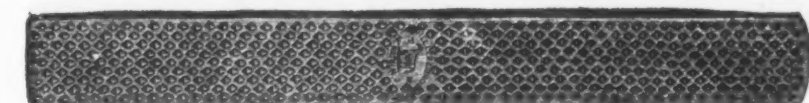
In answer to a question by the president, Mr. Stetson, Mr. Jenkins said that his punch took 1-16th inch cut all round in 1/4th iron. When the first punches were made the cutting shoulder was put on screw fashion; there was then a little trouble with breakage, but there is no breakage with the present form.



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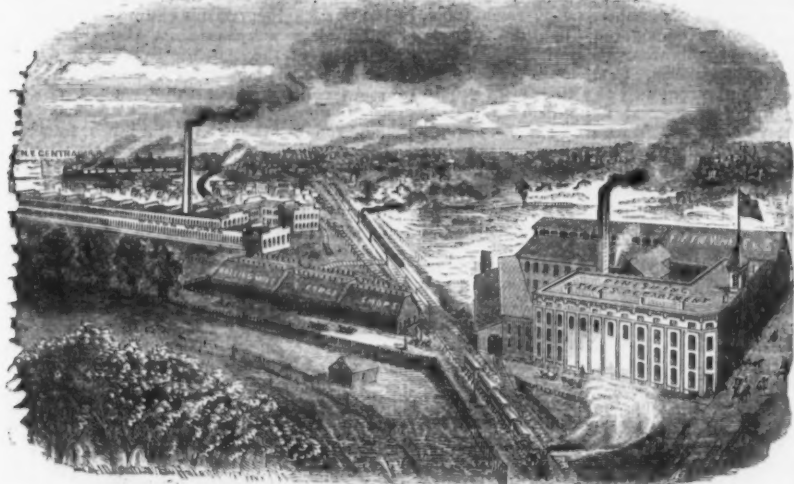
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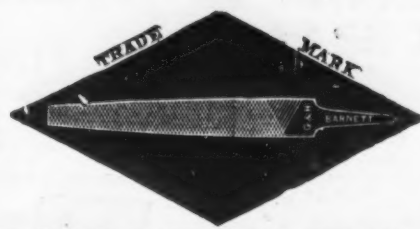
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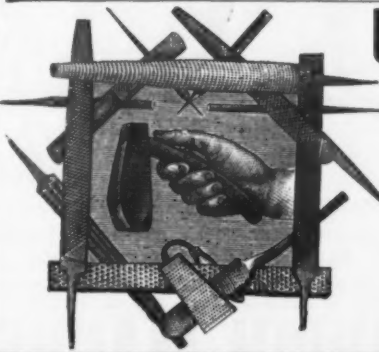
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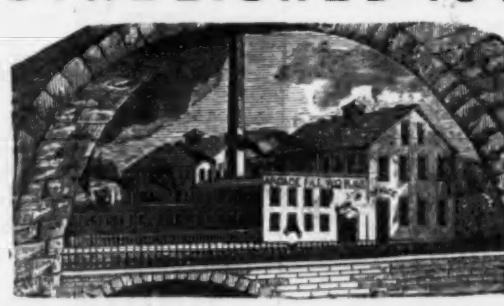
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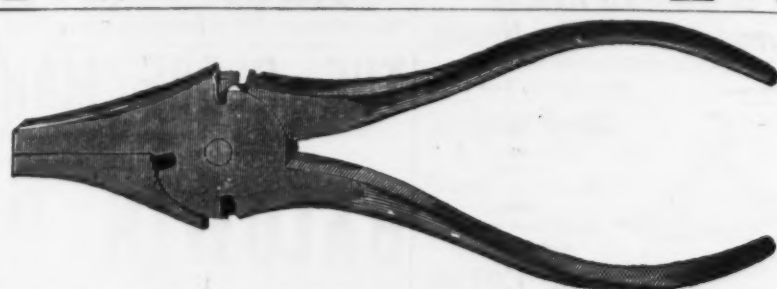
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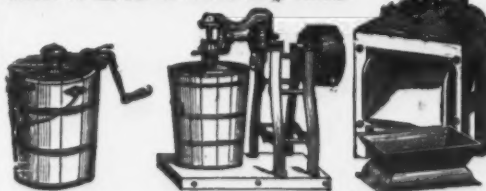
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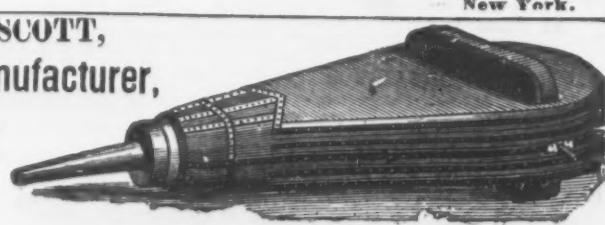
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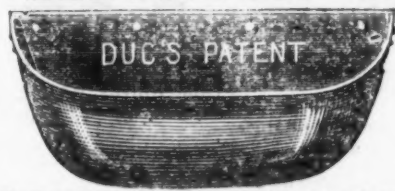
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## Iron Production in Canada.

The following is the memorial to the Finance Minister, on the subject of iron production in Canada, presented on Tuesday:

To the Hon. Sir S. L. Tilley, K. C. M. G., etc., Minister of Finance.—SIR: The undersigned members of the House of Commons, beg respectfully to address you on the subject of iron production in Canada, and the means to be adopted for establishing this industry on a large scale and on a permanent basis, as an important element in the building up of the future strength and greatness and prosperity of the Dominion. While recognizing the great benefit which the national policy of the present government has even already conferred upon the country, and the still greater mass of good results which it is destined to bring about in time to come, we are, nevertheless, deeply impressed with the conviction that the work of beneficial, patriotic legislation, now so well begun, requires to be carried still further, and that something more is yet necessary to complete it. In manufactures of iron Canada has already made good progress, and under the new policy is progressing more rapidly than ever before. But in the production of the metal itself, from the ore, and of wrought iron from pig metal, we have as yet made only small beginnings. From the experience gained in these small beginnings this lesson chiefly may be drawn, that something important is yet lacking, to wit—the extension of the national policy so as to bring within its vivifying influence the production as well as the manufacture of iron. And we are hopeful enough to believe that from the government which has so signally benefited the country by the establishment of this new policy, and particularly from yourself, as the minister who from official position has chiefly to do with such matters, the proper measures with a view to this end may reasonably be expected.

Some idea of the magnitude and importance of the iron trades in manufacturing countries may be had from the following tonnage and value of pig iron produced in the countries named in the year 1877:

	Tons.	Value.
Great Britain.....	6,628,664	\$78,085,306
United States.....	2,174,081	34,000,000
Belgium.....	418,306	\$57,124
Canada.....	15,000	210,000

The same of coal in 1877:

	Tons.	Value.
Great Britain.....	134,610,763	\$29,444,054
United States.....	50,000,000	75,000,000
Belgium.....	16,399,574	35,000,000
Canada.....	891,511	7,544,526

In 1878 the production of pig iron in Great Britain was 6,381,051 tons, and in 1879, 5,995,337 tons. The average of the last ten years is about 6,000,000 tons. We may compare Canada with Belgium, which has about 5,000,000 population to our 4,000,000. The figures above show how, with all our vast natural resources and extent of territory, we are behind the little Kingdom of Belgium in the production of iron. The total imports into Canada of iron and manufactures of iron during ten years, 1870-71 to 1879-80 were as follows:

Year	Value.	Year	Value.
1870-71.....	\$10,311,188	1876-77.....	\$9,330,952
1871-72.....	12,901,908	1877-78.....	8,298,517
1872-73.....	20,202,753	1878-79.....	8,519,381
1873-74.....	18,828,411	1879-80.....	10,217,288
1874-75.....	15,753,960		
1875-76.....	11,600,897	Total to yrs.	\$105,435,016

This large amount of ten years' importation was made up as under:

	Value.
Iron.....	\$33,704,154
Steel.....	5,408,121
Rails, plates, &c., for railways, iron and steel.....	31,357,532
Total.....	\$70,469,807
Machinery, hardware and iron manufactures generally.....	\$54,965,358
Total.....	\$125,435,165

It will be seen that for the last ten years the imports of iron, steel and railway iron and steel averaged \$7,000,000 per annum, and of machinery, general hardware and other manufactures, \$5,500,000 more, or a total average of \$12,500,000. The question may be considered, whether the greater part of this \$7,000,000 worth might not have been produced at home instead of being imported from abroad, all of this vast amount of money going out of the country to pay for it. But what a gain to the Dominion it would have been had we produced at home only the half of this consumption of seventy millions' worth.

What the above figures show may be put in another way, thus: Our average import of iron manufactures generally, including machinery, hardware and such like, is \$5,500,000 per annum. Our imports of the direct products of the smelting furnace and the rolling mill in the shape of pig iron, bar iron, steel, railway iron, &c., average \$7,000,000. What is wanted is something to create a Canadian production of the latter as well as the former.

We may assume that it is not necessary here to cite figures and statements from recognized authorities, to prove the fact that there are in the Dominion vast treasures of iron ore in great variety, of superior quality, mostly, and in quantity practically inexhaustible. It may be taken for granted that yourself and colleagues are well enough aware that in Canada we have iron enough in its natural state, and that there is no question as to the existence of the raw material of excellent quality and in unlimited supply within our borders. Nor is there any question, either, of the fact that some of our most extensive iron deposits are in localities very convenient of access and very favorably situated as regards facilities for transportation. What does appear to be the practical question is, however, the topographical relation of these iron deposits to available supplies of fuel for smelting furnaces and rolling mills. The different kinds of fuel used in iron making are these: Bituminous coal and coke, anthracite coal and wood charcoal. From bituminous coal and coke nearly the whole of Great Britain's immense production of iron is made, while charcoal is used in various countries, and anthracite only in the United States to any extent worth mentioning. East of Lake Superior our coal deposits, so far as known, are all in the Province of Nova Scotia; but within that comparatively small area there are inexhaustible supplies of bituminous coal only. Anthracite we might bring from Eastern

Pennsylvania, but, in our view, the effort should be made to develop iron production as far as possible from our own resources entirely. Bituminous coal we have in quantity sufficient; but a main point to be determined is how best to bring it and the ore together. There are in Nova Scotia considerable deposits of iron ore, lying near to the coal, and there the convenience of the two, each to the other, is not in question. If, however, coal is to be used in connection with the iron deposits in other provinces, then the question as to convenience and cost of transportation becomes a practical one. On this point we would suggest that coke, made at the pit's mouth in Nova Scotia, might be cheaply delivered in Quebec and Ontario, at or near the various localities where the principal deposits of iron ore, so far as known, are found. On the Intercolonial and other main lines of railway there are always long trains of empty cars going west, which might just as well as not carry coke to furnaces and rolling mills in Quebec and Ontario, though, of course, facilities for cheap transportation by water are not to be lost sight of. Coke would be a comparatively clean, light and easily handled freight, and its transportation westwards, in cars which would otherwise go empty, should not cost much. With a view to the development of an important inter-provincial trade, which would be of large benefit, both to coal mining down by the sea and to iron production along the line of the St. Lawrence and the lakes, the government might reasonably grant the best facilities and the lowest rates practicable on the Intercolonial Railway. As bituminous coal must be made into coke before being used in the smelting furnace, and as by taking coke from the pit's mouth an enormous saving in weight to be carried would be effected, the advantages of this plan are obvious enough. The supposed disadvantages of having to carry fuel long distances would in fact be reduced one-half or more by the simple plan of carrying the light, clean and easily handled coke instead of the heavy natural coke. This relates to fuel for smelting furnaces only, soft or bituminous coal in its natural state being the fuel used in rolling mills, or in the making of bar iron.

With regard to the carrying of coal to the ore, and of ore to the coal, a very general and serious misapprehension prevails. Because in Great Britain and the United States most of the old iron mines and furnaces which have long been worked are in the immediate vicinity of coal deposits, it is popularly supposed that all furnaces are supplied with both ore and coal native to the spot, and that without having the two lying together ironmaking cannot profitably be carried on. A few facts will show that while the bulk of the iron production of these countries is from districts where coal and ore are found near together, there is in both, but in the United States especially, a large production from furnaces which are supplied with coal or iron ore, or with both, brought from long distances. Great Britain imports large quantities of iron ore from Norway, Spain, Northern Africa and other places. The quantity of iron ore smelted in Great Britain in 1879 was 15,797,080 tons, and of this 1,417,343 tons, or nearly 10 per cent., was imported from abroad. And the import of iron ore from foreign countries into the United States is now about 600,000 tons annually, valued at \$1,500,000. Ore from the Lake Superior iron region, on the American side, is carried several hundreds of miles to furnaces in Ohio and Pennsylvania; Canadian ore, from the Ottawa district and the County of Hastings, is carried all the way to Crown Point and Troy, in Eastern New York, to the State of New Jersey, to Cleveland, to Pittsburgh and other points even further distant. It is just as easy to carry the coal to the ore as the ore to the coal; nay, easier, we should say, if the plan of first reducing the coal to coke be adopted.

In the Maritime Provinces whatever iron deposits there may be, have the coal so near at hand that there the convenience of the supply is not at all in question. In Quebec and Ontario, however, the cost of bringing coal or coke, as we suggest, from Nova Scotia, will always be an important element in the problem of iron making. Either soft coal in its natural state, or the coke made from it, must be fuel for furnaces and rolling mills, with which a large proportion of Canadian iron is made, if an iron-making country Canada is to be. But the problem of iron making in Canada is not wholly dependent for its solution upon the supply of mineral coal from any source. There might and should be a very large production of Canadian iron from charcoal, the material for which exists in superfluous, overwhelming abundance in "this wooden country." It so happens that the principal Quebec and Ontario mines, as far as discovered, are situated close beside inexhaustible supplies of waste timber, which is positively of no commercial value whatever, except for the single purpose of making charcoal for iron furnaces. In connection with the increasing demand for charcoal iron, the importance of this circumstance can hardly be over estimated. Every year the use of iron is extending; every year it is being taken for new uses; and it is a remarkable fact that for these new uses the prevailing demand is for iron of great strength and superior quality, capable of standing heavy and long continued strain. In shipbuilding, in iron bridges, and for many special railway requirements, charcoal iron or other iron approaching it in quality is in increasing demand, and the demand is sure to keep increasing very largely in time to come. Still more remarkably increased would the demand for this kind of iron be, should the time come when governments, with a view to public safety, shall insist upon the use of the best iron only in permanent constructions of all kinds, as well as in railway rolling stock, in all parts of the same where the use of inferior iron might put life and property in danger. That legislation will more and more take this direction in time to come is certain, and equally certain is it that an increasing demand for high class iron will be the consequence. In strength and resistance to strain and shock charcoal iron is before all other, and therefore its greatly extended use in time to come is a moral certainty. The bearing of all this on Canada's unequalled facilities for the production of the



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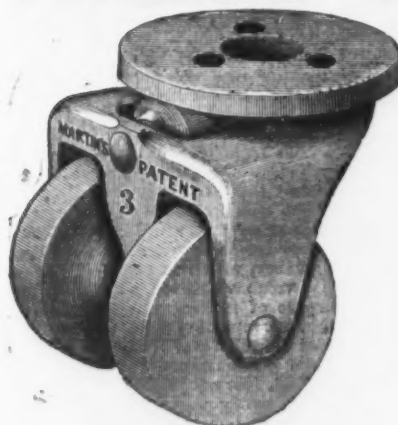


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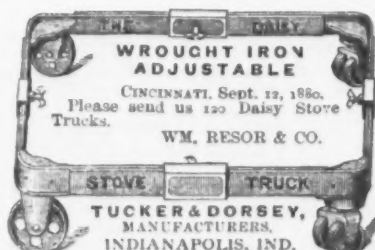
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Holds top or bottom Sash firmly at any height; locks them when closed. Where introduced the Hard-  
ware trade find a steady demand for it. Samples, in neatly-made working models for counter exhibi-  
tion, sent free by

THE SECURITY BLIND FAST CO., 19 Calender St., Providence, R. I.  
(See New York Wholesale Prices in The Iron Age.)

## Cutlery.

ALFRED H. HILDICK,  
12 Warren St., N. Y.,  
Importer of CHAINS, ANVILS, VISES, &c.  
Agency of  
HILL BROTHERS & CO., WALSALL, ENGLAND  
GENERAL HARDWARE MERCHANTS,  
And of  
BALL'S PAT. SOLID STEEL SHEEP SHEARS.  
These shears are unsurpassed for cheapness, dura-  
bility and utility. They are made of one solid piece  
of steel from point to point, and cannot be broken in  
use either in the bow or at the junction of the shank  
and blade. Samples can be seen at above address, or  
sample lots furnished.

## CORPORATE MARK,

Joseph Rodgers & Sons'  
(LIMITED)

CELEBRATED CUTLERY,  
No. 82 Chambers Street, New York.  
F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons'  
productions having considerably increased, they  
have, in order to meet it, greatly extended their  
Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers  
& Sons' Manufacture, please to see that they bear  
their Corporate Mark.

P. O. Box 392.

ESTABLISHED 1836.

Alfred Field & Co.,  
COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

## Guns and Pocket Cutlery,

## SPECIALTIES.

Headquarters for  
ELEY'S BROOK GOODS, WRIGHT'S ANVILS,  
WILSON'S BUTCHER KNIVES, &c.  
WORTHENHOLM'S POCKET CUTLERY AND RAZORS,  
FIELD, FRASER & CO.'S CONTINENTAL POCKET KNIVES,  
BUTCHER'S FILES, TOOLS AND RAZORS,  
JOSEPH ELLIOTT'S CELEBRATED RAZORS,  
WESTERN FILE CO.'S FILES,  
ENGLISH AND GERMAN GUNS,  
ROBERT SORBY & SONS' SHEEP SHEARS,  
STURDY FILES, WESTERN FILES,  
GREAT SHEEP SHEARS,  
CHESTERMAN'S TAPES,  
GERMAN COIL AND HALTERS and other CHAINS,  
BRADES TROWELS AND HOES  
CANASTOTA KNIFE CO.'S POCKET KNIVES,  
Etc., Etc., Etc.

All sorts of Hardware and Merchandise for im-  
port and export purchased on commission.ROBERT SORBY & SONS,  
SHEFFIELD,

MANUFACTURERS OF THE CELEBRATED

## Kangaroo Sheep Shears.

The best CORPORA TE MARK Every  
Shears made. Guaranteed.  
Shears

ALFRED FIELD & CO.,  
93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

FURNESS, BANNISTER & CO.,  
NEWARK, N. J.

Manufacturers of

## TABLE CUTLERY.

PRICES FURNISHED ON APPLICATION.

## THE SLAYTON RAZOR

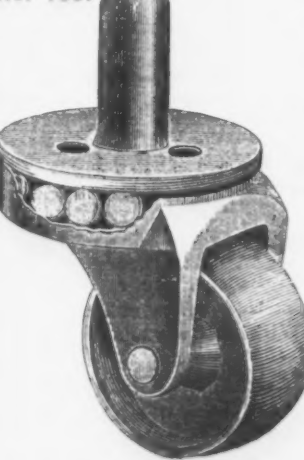
PERFECTION For Portability.  
For Cutting Quality  
For Finish.

Handles of German Silver, Nickel Plated. Blades of the  
Finest Steel in the World. Every Razor Fully Warranted.  
L. C. TOWER, Thermometer Manuf.,  
39 Exchange St., Rochester, N. Y., Sole Agent.  
Canvassers wanted. Sample by mail, \$1.

B. WORTH,  
RAZOR MANUFACTURER,  
Sheffield, England.

FULL CONCAVE RAZORS A SPECIALTY.  
Cheapest House in the Trade.  
Price lists mailed free on application.

No. 183.



## PAYSON'S

"Anti-Friction"

## Caster.

Can Never Wear Out or Fail to Act.

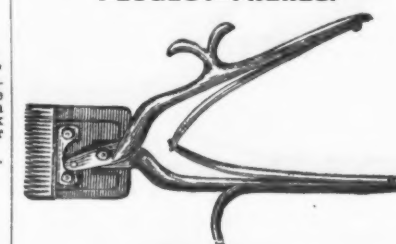
SENSITIVE, COMPACT AND HANDSOME.

Has plates riveted firmly together, with opening for screw  
driver. Works upon iron disks or rollers concealed from  
view, which relieve all friction and strain upon the stem, by  
placing the weight directly over the main wheel. No oil used  
on rollers. Made in all sizes and styles by

## PAYSON MANUFACTURING CO.,

CHICAGO, ILL.

## Cutlery.

French Clippers  
PEUGEOT FRERES.

Barber's Clipper.

We are sole agents for these Clippers. All or-  
ders should be addressed to us to obtain lowest  
prices.

McCOY & SANDERS,  
132 Duane St., New York.

Horse Clipper.

Silver Medal, 1878-Paris.

J. R. SPENCER & SON,  
Albion Steel Works, Sheffield,  
MANUFACTURERS OFFILES  
AND  
STEEL,  
Table Knives, Razors, Shovels, &c., &c.,  
of every description.

## CORPORATE MARK.

J. R. SPENCER & SON,  
SHEFFIELD

Granted 1749.

J. R. TORREY RAZOR CO.,  
FACTORY, WORCESTER, MASS.

No. 10.  
For Fine Cutting Qualities, and Adapta-  
tion to all Beards, our

## RAZORS

Have no equal.

Price Lists on application.

LAMONT  
PATENTCOMBI-  
NATION RAZOR

Manufactured by COPELAND, HALL & Co.,  
Rochester, N. Y.  
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## A. F. PIKE.

Pike Station, - New Hampshire,  
Manufacturer and Wholesale Dealer in  
Bluestone

For Scythes, Axes, Knives and Turpentine Hacks.  
Factories at Pike Station, N. H.,  
and Evansville & Westmore, Vt.  
Genuine Old Reliable,  
Indian Pond Red End,  
Premium Union,  
White Mountain,  
Lefebvre, Hucker,  
Diamond Grit,  
The New Boss,  
Lamont, Hagg,  
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Green Mountain,  
Black Diamond,  
Moving Machine,  
German Pattern,  
Chocolate, Ax Bits,

Stones made, labeled and branded in any style de-  
sired. PRICE AND QUALITY GUARANTEED. All the above  
brands are of clear, K. en grit and will not glaze.

Established in 1839.

## A. G. COES &amp; CO.

WORCESTER,  
MASS.,

Successors to

L. &amp; A. G. Coes,

Manufacturers of

THE GENUINE

COES

## Screw

## Wrenches.

PATENTED,

May 2, 1871.

December 20, 1871.

December 28, 1875.

August 1, 1876.

The backstrain when the wrench is used is borne  
by the bar—not by the handle.The strongest Wrench made, and the only suc-  
cessful Re-enforced Bar.

None genuine unless stamped

## A. G. COES &amp; CO.,

Our Agents, GRAHAM & HAINES, 113 Chambers St.,  
New York, carry a full line of our goods, and will be  
pleased to serve you at factory prices.

STANDARD  
GIRARD WRENCH.  
WARRANTED.

FOR  
STRENGTH  
AND  
Durability  
IT HAS  
NO SUPERIOR.

GUARANTEED  
IN  
EVERY RESPECT.

Wrought Bar, Head  
and Screw.

Owing to the in-  
creased demand  
for these justly  
Popular Wrenches,  
we are now manu-  
facturing more than  
any other establish-  
ment in the world.

Our Wrench hav-  
ing been imitated by  
other manufactur-  
ers, we have adopt-  
ed the above Trade  
Mark, and will here-  
after stamp all our  
goods.

SEND FOR  
TERMS AND PRICES  
GIRARD WRENCH MFG. CO., Girard, Pa.

CROCKER'S  
REVERSIBLE SELF-PACKING AND  
SELF-CLEANSING  
FILTER.

CROCKER FILTER CO.,  
174 High St., Boston, Mass.

W. E. PUFFER, General Selling Agent for the  
States of New York and New Jersey—3 Murray  
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## CHAS. E. LITTLE,

59 Fulton St., New York,  
Pump-Log and Tubing Augers  
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And Agent for  
Barnes' Wood-Working Machinery  
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Clements' Steam Band Saw.  
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Electro Plated Ware, German Silver and Britannia Spoons.



THE "NIAGARA."

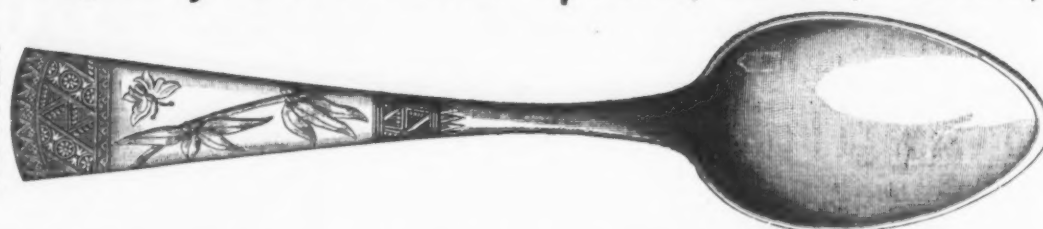
Factories, Wallingford Conn.

Salesroom, 75 Chambers Street, New York.

## HOLMES, BOOTH & HAYDENS,

MANUFACTURERS OF

Finest Quality Silver-Plated Spoons, Forks, Knives, &amp;c.

"JAPANESE"  
PATENTED."JAPANESE"  
PATENTED.

NOTICE.—We guarantee the base of our Spoons, Forks, &c., to be full 12 per cent. Nickel Silver, and extra heavily plated with pure Silver. Our goods are all hand burnished, and are first-class in every respect. We pack our Spoons and Forks one dozen in each box.

49 CHAMBERS ST.,  
NEW YORK.Factories,  
WATERBURY, CONN.18 FEDERAL ST.,  
BOSTON.

## WM. A. CLARK'S EXPANSIVE BIT WITH TWO CUTTERS.

Boring from 7-8 to 3 inches. Made of Jessop's Cast Steel and Warranted Interchangeable.



R. H. BROWN &amp; CO., Westville, Conn.



EXACT SIZE  
OF  
No. 7  
FRONT.

## DUNNING STEEL HORSE SHOES

Will outlast Three Iron Shoes.

Are FORGED from a SOLID BAR of STEEL. Afford a FIRM LEVEL BEARING, thereby securing to the horse the most natural position for comfort and speed. Is a SELF-CLEANING Shoe, and will not "ball" up. Equally good for Summer or Winter use. Will prevent horses from "calking" or growing corns. Can be re-sharpened as readily as an Iron shoe.

Read Following Testimonial:

Office of NORTH CHICAGO CITY R. R. Co.,  
CHICAGO, Feb. 16, 1881.

Chicago Steel Horse Shoe Company.

GENTS: We are using your "Dunning Steel Horse Shoe" on our car horses, and find they last us from three to four months before being worn out. We drive our horses about 16 miles a day—half over cobble stones and balance pavement. We consider them the Best Shoe made.

We pack shoes, single sizes, in kegs of 100 lbs. each; also, the following assortments, Front and Hind, 1, 2 and 3; and 3, 4, 5 and 6; and 7 and 8. The larger sizes are packed single numbers in a keg. Our Nos. 4, 5 and 6 are about same sizes and weights as the 2, 3 and 4 Iron shoes. Send for sample set for trial. Catalogues sent on application.

Manufactured exclusively by  
**THE CHICAGO STEEL HORSE SHOE CO.**  
Office, 24 West Lake St., CHICAGO.

## THE STANLEY WORKS,

MANUFACTURERS OF

### Wrought Iron Butts, Hinges

AND

### DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

FACTORIES:

WAREHOUSE:

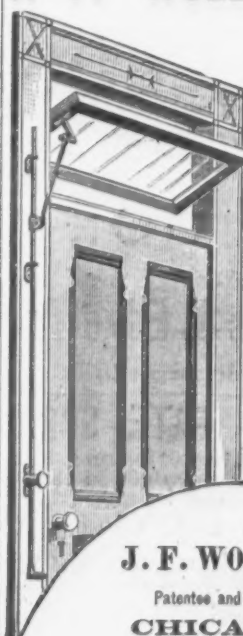
New Britain, Connecticut.

79 Chambers St., New York.

Torrey's Door Springs.  
S. ROEBUCK & CO.,  
Manufacturers,164 Fulton St.,  
NEW YORK.Torrey's Patent  
COG WHEEL  
Ice Cream  
Freezers.S. ROEBUCK & CO., Manufacturers,  
164 Fulton St., New York.

## J. F. WOLLENSAK'S

PATENT

Transom  
Lifter  
and Lock.For all kinds  
of Transoms,  
Fanlights and  
Skylights.Send for catalogue  
and price list.J. F. WOLLENSAK,  
Patentee and Sole Manufacturer,  
CHICAGO, ILL.

best charcoal iron, in large quantity, is obvious at a glance.

As an exaggerated idea of the importance of anthracite as an iron-making fuel appears to prevail with some people, it may be well to note the fact that in the United States the proportion of anthracite furnaces is decreasing, while the proportion of bituminous coal and charcoal furnaces is on the increase. The New York Iron Age, a good authority, gives the following figures, showing the number of furnaces of each kind in blast on the 1st of January, in the years 1880 and 1881, respectively:

	1880.	1881.		1880.	1881.
Charcoal.	93	150	Bituminous.	126	151
Anthracite.	165	152			

In connection with the statement from which these figures are taken, the remarks of *The Iron Age* are suggestive. "It will be seen," says this excellent authority, "that the number of charcoal and bituminous furnaces in blast this year is greater than at any time within six years, while the number of anthracite furnaces is less this year than last. One of the most marked features of this report is the large number of charcoal furnaces reported in blast. This (the month of January) is usually the season when these furnaces blow out for repairs, or in accordance with a belief that short blasts are better for charcoal furnaces. This year is an exception to the rule. The chief reason for this is doubtless to be found in the heavy demand for cold-blast charcoal iron, arising from large orders for car wheels made from it."

We come here to a point where there are two things to be put together. First, it is shown that the demand for charcoal iron is sure to be a rapidly increasing one. Next, we have the fact that no country in the world can match Canada in natural facilities for the production of charcoal iron. No other iron mines on the face of the globe have such a vast, inexhaustible background of charcoal timber supply behind them as ours. Already, in Sweden and Norway, the supply of charcoal timber is insufficient, and there being no other fuel for the purpose in the country, in order to save the industry from extinction, the government has interfered to limit the annual make of iron. Other countries, Spain and Algeria, for instance, have iron ore in great quantity, but neither timber nor any other fuel. The inference is clear that Canada needs but to take the right course to become the greatest charcoal iron producing country in the world. While this should be held established, it leaves untouched the certainty of another fact, that we have within our own borders, and independent of any foreign supply whatever, the material for a production of iron from bituminous coal and coke, in quantity to be limited only by the demand for it.

The estimate is made by experts that a blast furnace producing 100 gross tons of iron per day would employ 50 men, at an average of \$1.25 per day wages. This would give:

Wages paid per annum.....\$18,750  
Value of product per annum.....100,000

A rolling mill making 100 gross tons per day would employ from 500 to 600 men, at an average per day of \$1.50. This would give:

Wages per annum.....\$270,000  
Value of product per annum.....1,000,000

Such estimates as the above may be extended to the various products of iron, through successive stages of manufacture, showing an immense expansion of work and wages for the industrial classes, and the building up of the country's strength, both moral and material.

The high average of wages paid for labor, in connection with smelting furnaces and rolling mills, and the attraction which such employment would have in the way both of retaining our own population and bringing in more, is a consideration that may well engage the attention of our statesmen. In actual results, no other immigration policy whatever can equal that of providing the powerful attraction of ready work and good wages, to bring in new arrivals and to retain those who are already here. Create the work and the wages, and to the place where these are, people will flock of themselves, if no disagreeable circumstances forbid. Even very high wages might not suffice to draw English, Irish and Scotch emigrants, or emigrants from anywhere in Europe, north of the Alps, to anywhere in America south of the Potomac, and to keep them there. But in Canada, if only plenty of work at fair wages be secured them, emigrants from anywhere in Northern or Central Europe find themselves at home and contented at once. Not only as a means of increasing population, but also of developing a back-bone of material strength for the Dominion, the importance of making iron for ourselves, in our own country, and from home materials, cannot be overrated. Not alone the labor directly employed in iron production, but the employment which this industry creates for various interests outside, should be considered. Take for instance one item, the gain to railways and other agencies of transportation alone. Before the Committee of Ways and Means at Washington, last year, evidence was given respecting the outlay made at home by one single industry, that of the production of Bessemer steel, in connection with which the following figures were cited:

Capital invested.....\$30,000,000  
Wages annually.....7,500,000  
Paid annually for freight, mostly to railways.....8,000,000

Leaving out scrap iron, the Bessemer steel works created a market for the following materials, one year's supply:

	Tons.
Pig iron.....	257,345
Spiegel Eisen.....	67,493
Coal and coke.....	2,200,000
Iron ore.....	1,250,000
Limestone.....	600,000

The interest which railways and other transportation lines have in iron making at home is no small matter. Making iron abroad creates business for foreign railways; making it at home creates business for our own railways. Above we see the item of \$8,000,000 paid in one year to American railways and vessels by the Bessemer steel works; were there no such works in America the greater part of this sum would have gone to European railways instead.

In the year 1870 the American Congress

imposed on Bessemer steel rails a duty of 1 1/4 cents per pound, or \$28 per gross ton. That year the American production was only 30,357 tons, and the home price \$106.75, currency, or about \$94, gold, per ton. In 1880, ten years after, 917,592 tons were produced in the country, and the average home price was about \$50 per ton. By the duty a large American production, which otherwise would not have existed at all, has been created. Through this American production being added to the English production the price of steel rails has been reduced one-half. In this case protection has had the effect of making the article, not scarce and dear, as some contend, but abundant and cheap. It would be strange, indeed, if doubling the capacity of manufacture were to raise the price. The Bessemer steel works of the United States have now an aggregate producing capacity fully equal to that of the English works, and this addition to producing capacity has been wholly created by the duty.

The rise of the Bessemer steel industry in the United States, and its present magnitude and importance, are shown by the following figures:

PRODUCTION OF BESSEMER STEEL INGOTS DURING NINE YEARS:

	Net tons.		Net tons.
1872.....	120,108	1877.....	550,587
1873.....	170,554	1878.....	741,266
1874.....	171,133	1879.....	928,972
1875.....	375,517	1880.....	1,203,173
1876.....	525,996		

PRODUCTION OF BESSEMER STEEL RAILS, SAME PERIOD:

	Net tons.		Net tons.
1872.....	94,075	1877.....	432,160
1873.....	120,014	1878.....	550,349
1874.....	144,043	1879.....	683,968
1875.....	295,861	1880.....	917,593
1876.....	412,469		

The *Weekly Bulletin*, which is published at Philadelphia by the American Iron and Steel Association, states as a certainty that, large as the Bessemer steel production of 1880 was, it will be greatly exceeded in 1881.

It is our firm belief that the way to cheap iron, by the creation of a new Canadian supply, in addition to the existing British and American supply, lies through such a measure of protection as will suffice to bring this new Canadian supply into existence. And from inquiries made we believe, further, that such a measure of protection, sufficient to create this new Canadian production of iron, would be found in the imposition of duties on the following basis, namely: \$3.50 per ton on pig iron, with a proportionate increase on bar iron and manufactures of iron. But, while asking for this increase of duties, we do not by any means admit that there would be any permanent rise in prices to consumers in consequence. Fortified by the lessons of experience, many times repeated, we hold it certain that a new or largely increased Canadian production in the various lines of iron making and iron manufacture would soon bring about the result of more abundant supply and lower prices than before. But without a safe and sufficient basis of protection to rest upon, it is idle to expect that capitalists will sink large amounts of money permanently in such costly fixtures as blast furnaces and rolling mills. We have spoken of some small beginnings already made in Canada, but these are only experiments as yet—experiments that may not be very long continued, unless iron making be placed on the same satisfactory footing as most branches of manufacturing industry already are in Canada. The collapse of these new enterprises would be a most undesirable result, and both at home and abroad would injure greatly the prestige of Canada's new national policy, now in the way of being made conspicuously successful before the world. The present government has definitely adopted and boldly acted upon the general principle of building up home industries in the mass by means of protection, with, as we believe, the hearty support and approval of the Canadian people. And what we now ask is that the same principle be extended to the iron-making as well as to the iron-manufacturing and other industries. We hold that the logic of our country's position requires that we take this other step forward in the path of industrial legislation, lacking which the national policy still remains incomplete. The present duty of \$2 per ton on pig iron merely adds so much to what the consumer has to pay for it, while it falls short of being enough to benefit him by the creation of a new Canadian production of the article in addition to the supply from present sources. After much consideration of the subject, we come to this conclusion, that what will best suit Canada's circumstances is the imposition of the proposed increase of the duty on pig iron, with other changes to correspond. And we believe we are warranted in assuring the government that, were the changes made which we suggest, capital for the enterprise of iron making in Canada on a large scale would be forthcoming at once, and that very soon the success of the new step forward would be established by results. Hoping that the government may see the way clear to such legislation as is above indicated, we remain, your most obedient servants, JAMES DOMVILLE, Chairman.

EDWARD HAYCOCK, Secretary.

March 1, 1881.

Signed, besides, by nearly forty members of the House of Commons.

Steamboat Boiler Space.—The views of Supervising Inspector-General Dumont upon the interpretation of amended "Bill No. 10," met with so much dissent that the Solicitor of the Treasury was called upon for his decision, which is now rendered, substantially in agreement with the opinion of the Inspector-General, that the question of space between the boiler and wood-work of steamboats should be left to the discretion of the local boards.

Gen. Geo. B. McClellan, president of the New York Underground Railroad, says an application will be made to the Supreme Court this week to determine whether the Broadway or Mulberry street route shall be adopted. If the discussion is adverse to Broadway, the company propose to fall back on the route described in the charter of 1869.



# H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

## BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

### SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

PLATTSBURG, N. Y.

W. S. GUIBORD, Secretary.

ELY & WILLIAMS, Gen'l Agents for Eastern and Middle States, 1232 Market St., Philadelphia; 178½ Water St., New York; 36 Oliver Street, Boston. S. H. & E. Y MOORE, Gen'l Agents for Western States, 163 and 165 Lake Street, Chicago, Ill.

SAM'L G. B. COOK & CO., Agents for Southern States, Nos. 67 and 69 (old Nos. 5 and 7) German Street, Baltimore, Md.

SARANAC HORSE NAILS,

Blued or Polished.

Terms, Cash, within 60 Days.

Nos. 5 6 7 8 9 10

Cts. 26 23 21 20 19 18

METALLIC AMMUNITION,

Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,

Guaranteed Superior to any Imported.

## THE UNION METALLIC CARTRIDGE COMPANY,

BRIDGEPORT, CONN.



PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.

PERCUSSION CAPS.

PAPER and BRASS SHOT SHELLS.

F. C. Trimmed Edge, W. Proof.

F. L. Ground Edge, W. Proof, Foil Lined, equal to any imported.

D. W. P. Ground Edge, W. Proof, Central Fire, equal to any imported.

Musket, Paper and Tin Boxes.

Berdan, Orcutt and Wesson Primers.

Bullet Breech Caps.

PAPER.

Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

BRASS.

Berdan, Solid Anvil. Sturtevant, Movable Anvil. Buffington, Movable Anvil. Berdan Primer.

Kenney's Patent Indentation to prevent Wads from starting.

AGENTS: HARTLEY & GRAHAM, New York.

ESTABLISHED 1838.

Bolts, Lamps, Bands, Nuts, Buttons, Washers, Knobs, Couplings, Handles, Clamps, Screws, Corner Irons, Axle Clips, Clip Yokes, Slat Irons, Top Props, Joint Ends, Felloe Plates, Saddle Clips, Lining Nails.



C. COWLES & CO.,  
Manufacturers of  
CARRIAGE HARDWARE,  
NEW HAVEN, CONN.

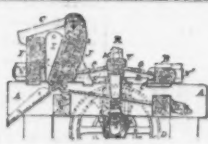
T. NEW'S  
PREPARED  
ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.  
BARRETT, ARNOLD & KIMBALL, Western Agts., Chicago, Ill.



BLAKE  
CRUSHER CO.,  
New Haven, Conn.



BLAKE'S  
Challenge Rock Breakers.  
Patented Nov. 18, 1879.  
See The Iron Age first issue of the month.

BROWER & LEEDS,  
81 Murray Street, New York.

AGENTS FOR

A. G. PECK & CO.,

Manufacturers of

"Peck's Champion Blade" Axes & Edge Tools

The Best Goods Made, and don't you forget it.

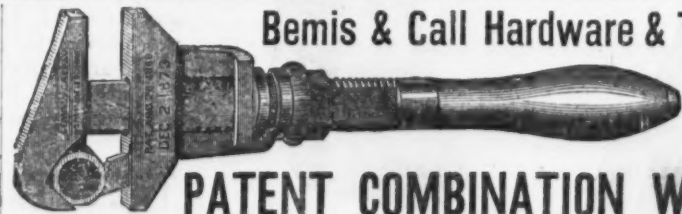


THE BUTLER DOOR AND GATE SPRING.  
Adjustable, Reversible, Self-locking. Has no Loose Piece. Needs no Wrench. Acknowledged the Simplest and Best Made.

BUTLER DOOR SPRING CO., Cleveland, Ohio.  
HORACE F. SISE, 100 Chambers St., New York Agents.  
BROWER & LEEDS, 81 Murray Street, New York.

THE "BOSS" SCYTHE RIFLE.

Warranted not to scale or glaze. Impervious to water, and not affected by heat. It is the best Rifle now offered.  
LEVI L. BROOKS, Manufacturer, Millbrook, N. Y.  
BROWER & LEEDS, Sole Agents, 81 Murray Street, New York.



Bemis & Call Hardware & Tool Co.

PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

The Boss Lemon Squeezer.

Malleable Iron and  
Tinned (pure Tin).



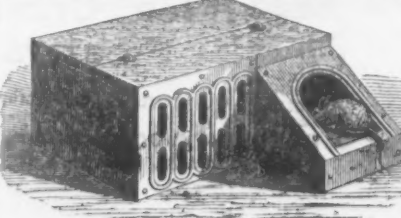
Acknowledged the Best.

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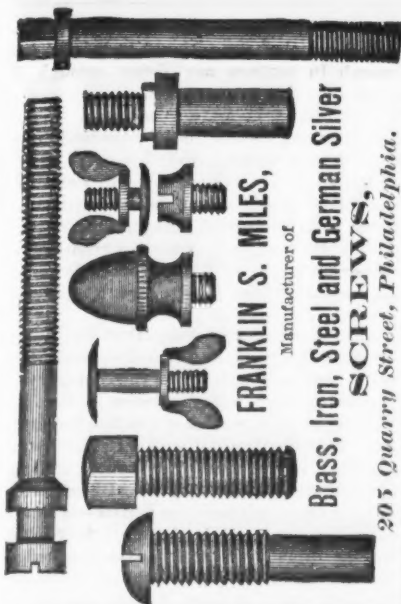
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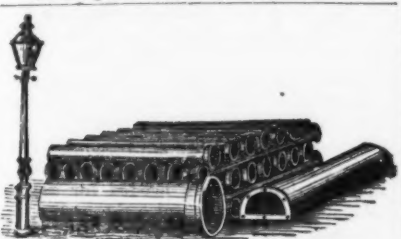


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400 CHESTNUT STREET.

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Manufacturer of  
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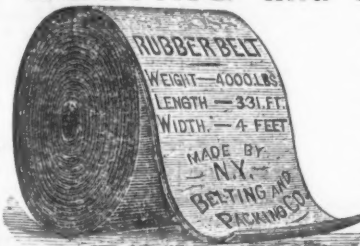
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ADAPTED TO  
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**RUBBER BELTING and PACKING.**

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Belting,  
Steam Hose,  
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This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the Largest Belts in the World! We are now making an Elevator Belt 36 inches wide and 2,500 feet in length, which will weigh over 15,000 pounds.

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Pat. 655. Plain and Rubber Lined. Pat. July, 1875.  
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Patented. ORIGINAL Patented.  
**Solid Vulcanite EMERY WHEELS**  
LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED  
Section of Emery Wheel showing Iron Center.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Pumps, Saws, Stoves, Fire Arms, Wagon Springs, Axes, Skates, Agricultural Implements, and small Machinery of almost every description.

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BEST IN THE WORLD.

For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.  
It represents that part of the packing which, when in use, is in contact with the Piston Rod.  
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This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

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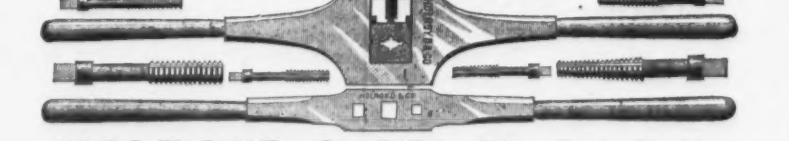
Pat. 11,708, 213,601. For Halls, Flooring, Stone and Iron Stairways, &c. Pat. July, 1879.  
This practical and indispensable article—especially for wear where exposed to ice, snow or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address:  
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Manufacturers of  
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Hay Knives & Corn Knives.  
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See our advertisement in The Iron Age first issue of each month.

**The American Demand for British Iron.**

The Colliery Guardian takes this view of the probable American demand:

Very anxious eyes are now turned to the United States to learn the probable extent of the demand for iron that is likely to come to us thence. The great increase in our production was first due to the stimulus that a large demand from America gave, and as that demand has been met, and that large production continues, it is natural that we should look with eagerness to learn whether there is likely to be any repetition of the demand. But it must not be forgotten that the circumstances have changed very materially at home since that vast demand set in. Concurrently with it there was a slight improvement in the manufactured iron and steel trades, and this has grown until at the present time there is a marked and general activity in the rolling mills and Bessemer works, so that the dependence upon the United States demand is neither so complete nor so general as it was eighteen months ago. And it is worthy of note that while the increase in the production of crude iron here has gone on, it has been in considerable degree in those classes of iron, such as hematite, for which there is an enlarged and still enlarging demand. That increase of production has been known, not only in Great Britain, but in Europe, and especially in the United States, and hence there is in the latter country a smaller dependence upon us for the supply than there was. But it is clear that, large as has been the addition to the output in the United States, it is not so large as the demand. It may be that there will not be that inquiry that there was a little more than a year ago for cheap kinds of pig iron. Last year we shipped an immense quantity of iron, in the form of scrap iron and of pig; until about eight months ago there were immense quantities stocked at all ports of importation in the United States. The quantities so imported have been reduced very materially, and that reduction is a proof that the native furnaces have not yet been able to overtake the demand for iron; but not till the stocks so held are near exhaustion will there be any demand for that class of iron. That period has been brought nearer by the almost complete cessation of shipments of crude iron to the United States during the past three months—except of hematite and certain well-known brands of Scotch pig. As the spring releases some of the rivers of the United States, and allows the supplies of the inland forges to be replenished, it may be expected that the stocks of pig iron at the ports will fall with some rapidity, and it is then that we shall learn whether any large demand will prevail for pig iron for the United States for the present year.

At present the probabilities seem to point to only a comparatively small addition to the ordinary demand for pig iron for that country. When the demand set in so intensely, it was partly with the expectation that there would not be any large shipment of manufactured iron and steel to the United States; but we see that there is a large export of certain classes of manufactured iron, and a still larger export of certain classes of fine steel and of steel rails to the United States. Moreover, makers in that country are finding out how they can procure our metals in the form that yields them the most profit, and thus there is now a large shipment of steel blooms from this country to America, and that will minimize the consumption of what may be called other forms of smelted iron. It is, of course, easy to be seen that it pays makers in this country better to sell blooms than to sell pig iron, and whether we sell the crude iron or convert it into blooms and sell the latter to the Americans, the effect on the pig-iron trade here is identical so long as the quantities are the same. With the vast addition to the consumption of iron and steel in the United States, there can be no doubt that for some forms of the metal that country must remain a purchaser from us, though it may be for diminished quantities and for certain kinds chiefly. Hematite and Bessemer blooms may in some degree take the part of crude iron, but while that activity in railroad construction that is now known in the United States continues, a full, if not a large, demand for iron may be expected from us. Last year over 7150 miles of railroad were made in that great country, and the rails and other forms of iron used—the vast quantities used in equipping them with rolling stock, and the continued requirements of these and the older railways for purposes of maintenance of way and works, must for years contribute to such a demand for iron as is not likely to be met by the present resources of the iron producers on the American Continent. In the winter there is usually a great falling off in the shipments of iron to the United States, and this has been made more apparent by the intense frost that has been known on both sides of the Atlantic, and by the consequent stoppage of trade. It may be expected that as this passes away the course of trade will settle into steadier channels for the spring, and there may be expected a revival in some degree of the demand from the United States; but it is evident that, with a large demand for articles manufactured from iron, we cannot expect to have so large a demand for crude iron as was experienced last year. The counterbalancing influence is to be found in the increased home demand for iron for manufacture, for use at home, on the European Continent, and in Canada and the United States. The largeness of the orders that have been given out by the chief railway companies for rolling stock and for permanent way at home are indications of the vastness of the consumption; and though there is an immense output, yet it is by no means improbable that there will be, when the summer revives the shipments, a demand that will meet it. This appears to be the outlook of the iron trade, and especially of those branches that depend upon the demand that has sprung up during the last few years from the United States.

A St. Louis paper publishes the startling statement that there is in Mexico a mountain of iron ore with 200,000,000 tons of "pure ore" in sight. It further says that

much of this ore ranges from 70 to 90 per cent. of iron. We wonder they call it ore, and how they expect to mine it.

**The Profits of Telegraphy.**

The report of the Western Union Telegraph Company for the quarter ending March 31, has just been issued. It is interesting as showing the remarkable earnings of the company, which is able, it appears, to pay the enormous amount for quarterly dividends of \$1,200,000, and still have a surplus remaining of \$315,495.

In the report presented by the Executive Committee at the last quarterly meeting of the board, held Dec. 8, 1890, the net profits for the quarter ending Dec. 31 (November being partially and December wholly estimated) were stated at \$951,806.62. The official returns for the quarter ended Dec. 31 showed the profits to be \$1,026,556.16, or \$74,749.54 more than the estimate.

The revised statement, based upon complete returns, shows the condition of the company at the close of the quarter ended Dec. 31, 1890:

Surplus Oct. 1, 1890, as per last quarterly report.....	\$198,129.86
Net profits, quarter ended Dec. 31, 1890.....	1,026,556.16
Total.....	\$1,224,686.02
From which deducting dividend of 1 1/2 per cent., interest on bonded debt, sinking fund appropriation, construction account and purchase of telegraph stocks and patents, to the total amount of \$1,076,400.88, leaves a surplus, January 1, 1891, of \$148,285.14. The net revenues for the quarter ending March 31 inst., based upon official returns for January, nearly complete returns for February and estimating the business for March, will be about \$1,609,173.87. Add surplus January 1, \$148,285.14, making a total of \$1,757,459.01.	
From which appropriating:	
Interest on bonded debt.....	\$107,000.00
Construction.....	175,000.00
Sinking fund appropriations.....	20,000.00
	\$302,000.00
Leaving a balance of.....	\$1,455,459.01
It requires, for a dividend of 1 1/2 per cent., on the capital stock that has been issued (\$41,073,410).....	\$616,101.15
For interest at same rate on certificates of indebtedness issued to Union Trust Company, in trust (\$38,925,590).....	\$583,898.85
Total.....	\$1,200,000.00
Deducting which, will leave a surplus, after paying dividend and interest.....	\$315,459.01
The board ordered a dividend of 1 1/2 per cent. on the capital stock, and 1 1/2 per cent. interest to the holders of the certificates for the new issue of stock on account of the consolidation.	

**Invasion of Property by Locomotive Smoke.**

In the suit brought in September, 1878, by Dr. Salvatore Caro against the Metropolitan Elevated Railway Company, the order of the General Term of the Superior Court, upon the decision of that tribunal reversing on appeal a judgment for the defendant on demurrer to the complaint, has just been settled and filed, although the decision was rendered in April of last year by the late Chief Judge Curtis and Judge Spier. The action was brought to enjoin the railroad company from running its trains in front of Dr. Caro's dwelling in Fifty-third street. Upon the argument upon appeal, Generals Benjamin F. Butler and Roger A. Pryor for plaintiff, admitted at the outset in favor of the defendants a large part of the legal questions which were supposed to be at issue, narrowing the controversy simply to the points, first, that plaintiff as owner of the house and lot had a right to its use and enjoyment free from the disturbance and invasion of the cinders, the stench of noxious gas and smoke, of which among other grievances the plaintiff complained, and which the defendant by the demurrer admitted were impinged or projected upon the premises, and that such disturbance and invasion constituted a taking of property in the sense of the constitutional inhibition. Second, that independent of such constitutional guarantee, the injury inflicted, as stated in the complaint and admitted by the demurrer, constituted an actionable wrong, entitling the plaintiff to relief. The order now entered being, according to previous stipulation, made absolute, without giving leave to the defendant to answer, the case, after judgment entered thereupon at Special Term and an appeal pro forma to the General Term, will go to the Court of Appeals upon the questions of law; and the final judgment, as passing upon a novel application of a well-settled principle of law, will be awaited with interest.

At a recent meeting of the Delaware County Institute, in Medina, Pa., Mr. W. G. Burk read a paper on the early iron works of the American colonies, written to combat the assertion, recently made in a Pittsburgh paper, that the first bar of iron rolled in this country was rolled in that city in 1818. Mr. Burk had seen iron rolled in Rockdale some years before that date. He quoted from Kalm, Acrelius and others to show that exportations of bar iron were going on about 70 years previous to that date. In 1752, 4491 tons of bar iron were exported from Philadelphia. Some of the earliest works of the kind were in Delaware County. John Taylor's, at Glen Mills, was started in 1746.

Trades union strikers in different parts of the country are having only partial success, but there is more or less difficulty among stove molders in Troy, St. Louis, Wheeling and Pittsburgh. In most cases the demand is for an increase of wages.

A cartridge manufacturing, under the patronage of the Turkish government, has been opened in Constantinople. It is provided with American machinery capable of turning out 30,000 Martini-Henry and 20,000 Winchester cartridges daily.

In the New York Legislature the Senate Committee on Cities have agreed to make a favorable report of the bill prohibiting the holding of a world's fair in any of the parks of New York City.



# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, March 17, 1881.

DAVID WILLIAMS, Publisher and Proprietor.  
JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.

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and advertisements on our regular terms.

## CONTENTS.

First Page.—Rail Patterns.  
Third Page.—Rail Patterns (Continued).  
Fifth Page.—Rail Patterns (Continued).  
Seventh Page.—Rail Patterns (Continued). A  
New Form of Punch for Iron Plates.  
Ninth Page.—Iron Production in Canada.  
Eleventh Page.—Iron Production in Canada  
(Continued). Steamboat Boiler Space.  
Thirteenth Page.—The American Demand for  
British Iron. The Profits of Telegraphy. Invasion  
of Property by Locomotive Smoke.  
Fifteenth Page.—Reissued Patents. Move-  
ments of Labor. Meretriciousness in Stove Orna-  
mentation.  
Seventeenth Page.—Washington Notes. Mr.  
Alex. Laughlin, Jr. Chemical Specialists. Cast  
Iron vs. Fire-Brick Stoves. Can the Magnetism  
of Iron and Steel be Used to Determine Their  
Physical Properties.  
Nineteenth Page.—Can the Magnetism of Iron  
and Steel be Used to Determine Their Physical  
Properties (Continued). The Springfield Iron  
Company and its Workmen. A New American  
Built Steamship. Reckless Business Methods.  
The Window Glass Trade.  
Twenty-first Page.—Cornice Machine Litiga-  
tion.  
Twenty-third Page.—Trade Report. General  
Hardware. British Iron Market. Iron. Metals.  
Twenty-fifth Page.—Imports. Exports.  
Coal. Old Metals. Paper Stocks, &c. Philadelphia.  
Pittsburgh. Chicago.  
Twenty-seventh Page.—Chattanooga. Boston.  
Louisville. Cincinnati. New Orleans. St. Louis.  
Baltimore. Cleveland. Our English Letter.  
Twenty-ninth Page.—Foreign. Last Even-  
ing's Meeting of the World's Fair Commission.  
Industrial Items.  
Thirty-first Page.—No Return of Legal  
Tenders to Banks which Surrendered their Cir-  
culation. Scientific and Technical. Employer's  
Liability. Canadian Duties on Iron Bridge Ma-  
terials.  
Thirty-third Page.—The Iron Age Direc-  
tory.  
Thirty-fifth Page.—New York Wholesale Prices.  
Thirty-seventh Page.—New York Wholesale  
Prices (Continued).  
Thirty-ninth Page.—New York Wholesale  
Prices (Continued).  
Forty-first Page.—Philadelphia and Pitts-  
burgh Hardware and Metal Prices.  
Forty-third Page.—Boston Hardware and  
Metal Prices.

The opening of the Mexican Telegraph  
Company's cable from Brownsville, Texas,  
to Vera Cruz is one of the events of last  
week. The congratulations of the presidents  
of the two republics, Garfield and Gonzalez,  
have been exchanged, and mercantile cor-  
respondence is now moving freely both  
ways. In his response, President Gonzalez  
says: "The government of Mexico and its  
people congratulate themselves upon the  
establishment of a new link binding the  
relations between the two countries for the  
mutual advancement of their friendship,  
commerce and industry." We learn from  
Mr. Scrymgeour, president of the telegraph  
company, that contracts for the extension of  
the line along the Central American coast  
will be completed within the year.

## Reissued Patents.

One of the abuses of the liberal provisions  
of our patent laws which was threatening to  
seriously embarrass their utility, has been  
the indiscriminate granting of reissues. It  
has been the desire of patent officials and  
the courts to give as much latitude as possible  
to inventors. The section referring to the re-  
issue of patents has, therefore, been construed  
as liberally as possible. This was taken advan-  
tage of by shrewd men who, by the injection  
of new claims and the inflation and general-  
ization of old ones, have gained a monopoly  
of a whole class of inventions. It has be-  
come almost the rule to enlarge patents by  
reissuing them, and, in the hands of strong  
and shrewd men, has given patents an elas-  
ticity which was not contemplated by the  
framers of the law. That this was not  
intended is clearly shown by the wording of  
Section 4916 of the Revised Statutes, which  
is as follows:

"Whenever any patent is inoperative or  
"invalid by reason of a defective or insuf-  
ficient specification, or by reason of the  
"patentee claiming as his own invention  
"or discovery more than he had a right to  
"claim as new, if the error has arisen by  
"inadvertence, accident or mistake, and  
"without any fraudulent or deceptive in-  
"tention, the Commissioner shall, on the sur-  
"render of such patent and the payment of  
"the duty required by law, cause a new  
"patent for the same invention and in ac-  
"cordance with the corrected specification  
"to be issued."

The purpose and intent of this section are  
too evident to require any elaborate defini-  
tion. Yet, as we have stated above, it was  
made the means of extending the scope of  
an invention by obtaining a reissued patent.  
In a series of recent decisions in United  
States courts, this matter has received care-  
ful attention, and there is every probability  
that a stricter interpretation of the law will  
be made in the future.

The first of the more important cases de-  
cided recently is that of the Giant Powder  
Company vs. the California Vigorite Powder  
Company et al. Judge Field, of the United  
States Circuit Court of the District of Cal-  
ifornia, in his decision rendered October 12,  
1880, takes strong ground. He holds that a  
reissue can only be had when the original  
patent is invalid or inoperative by reason of  
defects provided for by the section above  
referred to. The issue by the Commissioner  
of a new patent does not preclude the exam-  
ination by the courts to see whether he ex-  
ceeded his jurisdiction. If he has, the re-  
issued letters patent must fall. He holds that  
if a patent does not cover all the points of  
an invention, the proper course is to take a  
separate patent for what is new, instead of  
endeavoring to cover subsequent discoveries  
by a reissue. If the original patent is valid,  
a reissue is without authority of law, and,  
therefore, broader claims in a reissue  
cannot be sustained.

The second important decision bearing  
upon this question was rendered by Justice  
Bradley, of the United States Supreme  
Court, December 13, 1880, in the case of the  
Swin Turbine and Manufacturing Com-  
pany vs. Ladd, appealed from the United  
States Circuit Court for the District of Mas-  
sachusetts. Here again it was held that the  
law does not authorize the reissue of patents  
in such a manner as to allow their scope to  
be enlarged so as to include matters not  
embraced in the original invention. It is  
only in a clear case of mistake—not in error  
of judgment—that the patent may be en-  
larged. To extend the reissued patent be-  
yond the scope of the invention, as set forth  
in the original specification, is fatal to the  
patent itself.

Judge Lowell, of the United States Circuit  
Court for the District of Massachusetts,  
decided the third case of Smith et al. vs. Mer-  
riam et al. on the 22d of January, 1881. The  
question involved in this case was whether in  
a reissue a patentee can modify or divide his  
claims so as to embrace, severally, the dis-  
tinctive features of the thing invented. Judge  
Lowell decided that he could, but he differs  
from Judge Field in his interpretation  
of the jurisdiction of the Commissioner.  
The real question is whether the courts  
should correct a mistake made by the Com-  
missioner, by destroying a new patent after  
the old one has been surrendered.

The leading decision, and that which lays  
down the law—that of Judge Bradley, of  
the Supreme Court—is very emphatic. It  
declares that the practice of greatly modify-  
ing patents by reissue must cease, and that  
a broadening of the claims, or addition to  
them, can only take place in exceptional  
cases, instead of being almost the rule, as  
hitherto. Judge Field holds that the fact  
that a reissue has been improperly taken is  
fatal to the patent itself, and Justice Brad-  
ley takes the same view. In the case  
decided by the latter, however, the lower  
court had construed the reissued patent in  
such a manner as to confine its claims within  
the legitimate bounds. As, under this con-  
struction, there was no plausible pretense that  
an infringement had been committed, Jus-  
tice Bradley affirmed the decree. His  
decision, however, clearly indicates that he  
considers an extension by reissue fatal to  
the patent. Judge Lowell has defined a case  
where a reissue was properly granted, but  
he does not decide as to its validity.

The decisions referred to put a stop to all  
attempts by inventors to embrace in a re-  
issue of his patent, obtained after a change of  
officers in the Patent Office, the death of in-  
ventors or the dispersion of documents,

claims shown to be unfounded at the time  
of his first application. Nor can he, by the  
same means, embody in a reissue modified  
claims suggested by later improvements of  
third parties. It has been a trick, quite fre-  
quently practiced, to frame a patent loosely,  
and then, when new developments had  
been made by others, to obtain a reissue  
so worded as to embrace them, and then  
sue infringers of the claims of the reissued  
patent. It will be impossible in the future  
to obtain control of a rising industry by this  
means.

Another and a very salutary effect which  
Justice Bradley's ruling will have, is that  
patent specifications will have to be drawn  
up much more accurately than hitherto.  
This will naturally increase the cost of  
obtaining patents, and we know of reputable  
firms of solicitors who have doubled their  
fees for taking out patents since the publica-  
tion of the decisions.

## Movements of Labor.

The past few months have been crowded  
with matters of interest in connection with  
labor which have more than a passing inter-  
est. They are each adding to the code of  
both written and unwritten law that defines  
the duty and regulates the action of mas-  
ters and men. We have endeavored to follow  
the course of these movements, but it may  
be well to review the happenings of the past  
few months in a single article.

The most important feature of the labor  
contest has been the several decisions of the  
courts on the question of conspiracy. Three  
decisions have been rendered in three differ-  
ent States—New York, Pennsylvania and  
Missouri. These decisions have been in con-  
nection with mining, rolling mill and me-  
chanical work. They have settled, so far as  
such decisions can settle anything, three  
points:

1. That an action for conspiracy can be  
maintained against a part of the employees  
of a works who conspire to induce a part of  
the whole of the remaining employees to  
leave their work at such a time as will result  
in loss to the employers—that is, if it is  
shown that there was a deliberate intention  
to inflict this loss, and that the fact that such  
loss would result was used as an argument  
to induce men to strike.

2. That the simple enticing of men from  
their work when the men were neither in  
fact nor in theory under contract, and when  
no intimidation was used, would not render  
the parties so enticing liable to punishment  
for conspiracy.

3. That it is not necessary, for a con-  
viction under acts that forbid persons to hinder  
others who desire to labor for their em-  
ployers, to use physical force, but that ter-  
rorism, the application of opprobrious epi-  
thets, and the danger of the infliction of  
clandestine punishment, are "hindering" in  
the eye of the law.

There is a feature in connection with the  
law of conspiracy that has been often noted  
by those who are unfortunately brought into  
contact with "strikes"; that is, the disinclina-  
tion on the part of employers to enter suits  
under the laws of conspiracy existing in  
almost every State. In nearly every case of  
importance that has been brought, however,  
conviction has resulted. In Pennsylvania,  
for example, we recall convictions in the  
anthracite, Clearfield and Western Pennsylv-  
ania bituminous regions, and yet the cases  
in which suits are brought are very few, com-  
pared with the number of strikes involving  
great loss. Our recollection is not quite  
clear, but we have the impression that the  
Pennsylvania Railroad brought no suits for  
conspiracy in connection with the great  
strike of 1877.

Another feature of the labor movements  
of the past few months has been the abso-  
lute failure of every attempt to settle labor  
disputes by arbitration. To this general  
statement there is one exception—that of  
the cigar works of Messrs. Straiton & Storm,  
of New York. In case of trouble one side  
or the other has offered arbitration again  
and again, but it has either been refused,  
or when it has been tried it has failed. These  
failures have arisen from two causes:

1. A belief on the part of one side or the  
other to a contest that it alone knew what  
was right and was alone capable of decid-  
ing what was just, and that the other  
side was wrong, unjust and unreasonable;  
or, in other words, the old feeling of sus-  
picion and jealousy that has been the prolific  
cause of so much trouble between employer  
and employee.

2. A feeling of the employers or employed,  
as the case might be, that they had the power  
to compel acquiescence in their demands,  
and a determination to use that power.

It is interesting to note the complete  
change of opinion regarding arbitration on  
the part of certain workmen. A few years  
ago, for example, one of the presidents of the  
Boilers' Union was anxious to find some way  
to compel employers to accept arbitration  
as a means of settling disputes. One of  
his successors, hearing of the advantages  
that arbitration had brought to the iron  
workers of England, wrote to their secretary  
to obtain information as to the method, with  
a view to its adoption here. The Iron  
Workers' Association are now taking the  
other tack, and decidedly proclaim that they  
will have nothing to do with arbitration un-  
less it is one sided and they appoint the  
arbiters.

The old questions of truck, hours of labor  
and intervals of payment, have all been  
made the subject of legislative enactment.

The results have been very meager, and the  
laws have in most cases been dead letters.  
A most absurd act has just been introduced  
into the Pennsylvania legislature, which  
provides heavy penalties for any employer  
who does not pay his employees every two  
weeks in lawful money. In some businesses  
this is absolutely impossible, and the very  
best that can be done is to pay money on  
account. In window-glass blowing, where  
the blower is paid by the square foot, the  
price per square foot depending on the  
quality of the glass made, it would be im-  
possible to carry out the provisions of this  
bill. In regard to hours of labor, we also  
notice that the granite cutters are abandon-  
ing the agitation for eight hours and suggest-  
ing a compromise in nine hours.

Another feature in connection with labor  
is the power of organization it is developing.  
Four years ago we called attention to the  
movement in progress in the ranks of labor  
in favor of organization. This has devel-  
oped and strengthened. The local unions that  
have existed all over the country in the  
same trades are uniting in one organization,  
and in all large cities trades and labor as-  
semblies are organized, consisting of all,  
or nearly all, of various unions in these cities.  
If reports are to be believed, the Knights of  
Labor have become a very powerful organi-  
zation.

## Meretriciousness in Stove Orna- mentation.

At the last meeting of the National As-  
sociation of Stove Manufacturers, a very  
interesting discussion grew out of the ques-  
tion whether nickel plating in stove orna-  
mentation is or is not "meretricious." When  
we come to analyze the meaning  
of this word, we realize that it is a rather  
rough adjective to apply to stove orna-  
mentation; but when used by an art  
critic, it must be taken in a Pickwickian  
sense. The language of art criticism is  
always intemperate. Strong convictions usu-  
ally seek strong expression, and the art  
critics are so used to pounding and pum-  
eling the artists and their work with sharp-  
cornered adjectives, that when they talk to  
manufacturers on art matters they are very  
apt to heave this same kind of rocks at  
them.

But, fortunately for all parties in interest,  
the discussion as to whether nickel on stoves  
is or is not "meretricious" did not take an  
etymological turn. It was assumed to  
mean "in bad taste," or something of that  
sort, and the discussion hinged on the com-  
mercial aspect of the question, with which  
the art critic has little or nothing to do. In  
this article we shall endeavor to discuss the ques-  
tion moderately and fairly, from both the ar-  
tistic and commercial standpoint.

In connection with stove construction,  
there is a legitimate and an illegitimate use  
for nickel, and it does not become "mere-  
tricious" until it is used illegitimately. In  
itself considered, and in its proper and legiti-  
mate uses, nickel is a most respectable  
metal. It is easily and cheaply deposited,  
takes a beautiful polish, resists oxidation  
better than any well-known metal except  
gold, is extremely hard, and holds with great  
tenacity upon any surface properly prepared  
for the bath. Nickel plating is of immense  
use in the arts, and nothing equally cheap  
which is now known could be substituted  
for it. We do not like its color as a con-  
trast to the plumbago luster of a polished  
stove, but that is a matter of taste, and the  
fact that we do not admire it does not neces-  
sarily make the nickel trimmings on a stove  
"meretricious." When the use of nickel by  
stove manufacturers began, it was used  
legitimately, and at once found a place from  
which it is doubtful if it will ever be wholly  
dislodged. People became tired of iron and  
brass knobs, and no better metal than nickel  
for plating them has ever been found. Pro-  
perly put on, it will last as long as a stove,  
and under ordinary conditions will need  
little or no cleaning when in practical use.

Nickel knobs were a good thing for those who  
liked them, and not "meretricious." Then  
manufacturers began to consider what fur-  
ther use they could make of this metal.  
They nickeled their name plates, which  
practically had their origin in an attempt to  
make an advertisement serve as a nickel-  
plated ornament, and in this use nickel  
became "meretricious." They then nick-  
eled the top ornament, if the stove was a  
heater, and when confined to a rude attempt  
at ornamenting, its use was legitimate  
enough, though not always, if often, in good  
taste. Then rings were polished and nickel  
plated, and the nickel spread from one part  
to another until, as was said in the Detroit  
meeting, the manufacturer who proposes to  
use this year more nickel than was used  
last year, will have trouble to find a place to  
put it except on the poker or the pipe collar.  
Much of this use of nickel is unmistakably  
"meretricious," using the word advisedly,  
with full knowledge of its derivation and  
lexical significance.

Nickel plate in stove ornamentation is  
"meretricious" when put on only for show  
and to help sell a stove, without reference  
to utility, appropriateness or durability. It  
is a well-known fact in physics that a nickel-  
plated surface does not radiate heat well,  
and that by the amount of its nickel orna-  
mentation the efficiency of a heating stove  
is diminished. It is a well-known fact in  
experience that when applied to a surface  
which becomes hot, it will lose its color and  
turn an ugly blue-gray, and that its natural  
color cannot be preserved under such cir-  
cumstances. It is also a well-known fact

that cast iron does not give a suitable sur-  
face for nickel deposition. It is not fine  
enough in texture nor dense enough in  
structure. Nickel deposited on iron rarely  
has, and never keeps, a good color. Every  
manufacturer knows that it adds nothing to  
the utility of a stove, and that it is simply  
cheap, tawdry finery, which will not stand  
the test of use. When deposited on spun  
brass, as in knobs and certain new patterns  
of urns, these objections are in a great degree  
met and answered. It then becomes simply  
a question of taste, for such use is legitimate  
enough.

The manufacturers claim that the liberal  
use of nickel pays, and that the profit that  
is in it removes it from the category of  
"meretricious" ornamentation. Not so.  
The object of meretriciousness has been gain  
from time immemorial, and gain has never  
dignified it nor made it honest. Nickel  
illegitimately used—that is, without refer-  
ence to appropriateness or fitness—is simply  
an allurements. It is designed to capture  
the untrained eye and please the vulgar  
taste. There is no question that it has paid in  
the past, and that there is still a market for  
it; but so it is with all that is meretricious.  
So long as manufacturers make stoves to  
sell, so long will they make those which will  
sell most readily. If meretriciousness is a  
saleable quality, they will, of course, con-  
tinue to use meretricious ornamentation;  
but, meanwhile, they should not object to  
having things called by their right names.

Stove founding is one of our great na-  
tional industries, and while it has developed  
rapidly in many ways, it has not yet felt  
the impulse of such an art development as  
we should like to see. There is too little of  
excellence in form, proportion and orna-  
mentation, and too much dependence upon  
the meretricious millinery of nickel trim-  
mings, polished edges and the like. There  
is encouragement for efforts to supply a  
demand for stoves which shall be household  
ornaments, and not merely obtrusive heat-  
ing machines, as showy as cheap finery can  
make them, to be tolerated only so long as  
they are imperatively needed for use, and  
relegated to the cellar or attic with a sigh  
of relief.

The indications are that under Secretary  
Windom our friends who desire to get cot-  
ton ties, barrel hoops and tank iron at  
35 per cent. ad valorem will have to punch  
more holes. In fact "holes" will command  
a premium. We do not believe that Senator  
Sherman was any less a protectionist as Sec-  
retary than he was when helping to frame  
protectionist laws, but as the *Bulletin* of the  
American Iron and Steel Association point-  
edly says: "We say this without intending  
"any grave reflection on ex-Secretary  
"Sherman's oversight of the customs division  
"of the Treasury Department. His error has  
"been in retaining incapable subordinates,  
"and not in personally preferring to con-  
"strue our tariff laws in favor of foreign  
"manufacturers and against the interests  
"of American capital and labor. We believe  
"ex-Secretary Sherman to be a protectionist  
"who has given his assent to decisions un-  
"friendly to American interests rather  
"through the supposed requirements of  
"official duty, than through any sympathy  
"with those who would evade by legal  
"quibbling either the letter or the spirit of  
"the tariff law." It is a curious fact, how-  
ever, that the decision in favor of barrel  
hoops and tank iron were both in the inter-  
est of the Standard Oil Company, a Cleveland  
organization. However, the decision of the  
Collector was promptly overruled.

The strike of the bench molders at Jacobus  
& Nimick Mfg. Co.'s works has developed a  
peculiar phase of strikers' tactics. The  
strike was for 10 per cent. advance, which  
the company at first refused to give, claim-  
ing that they were paying from 10 to 20  
per cent. more than any other bench mold-  
ers in the vicinity were getting, and offered  
to leave the dispute to arbiters, which was  
refused. They then offered to pay by the day  
on the basis of what the men were earning,  
which was also refused. After all attempts  
to compromise had failed, the company, hav-  
ing work that must be done, agreed to pay  
the prices and wanted to set twenty men at  
work, but the men refused to go to work  
unless the whole force was employed, and  
this without any reference to the fact  
that there was work for only twenty. It is  
fair to say that the union does not endorse  
this last action of the men, and so, though  
they are on a strike, there is no strike; in  
other words, any union molder is at liberty  
to take their places. This is certainly a new  
phase of the labor contest, when the men  
not only say what they will work for, but  
that work must be supplied for everybody in  
the works.

The "Worshipful Company of Cutlers, of  
London," carried away by the progressive  
movements of our times, is beginning to aid  
the trades it represents by diffusing knowl-  
edge concerning them. Besides providing  
the means for a system of technical educa-  
tion, the Cutlers' Company has invited  
practical men, prominent in special branches  
of the trade, to deliver lectures before them.  
This movement has been eminently success-  
ful thus far, and the last one, by Mr. Henry  
Seeborn, of Sheffield, on the "Use of Steel,"  
is full of valuable practical facts and sug-  
gestions. To these we shall return at an  
early date; we wish at the present time only  
to call attention to the high tribute which  
Mr. Seeborn pays to American crucible  
steel manufacturers. Eighteen months since



he came to this country with the impression that he would have little to learn from, but much to teach to, the makers of crucible steel. A single visit to a Pittsburgh establishment converted him, and he now publicly announces not alone that he found everything constructed on the latest and most improved system, and that he was taught many details of value, but also that he was surprised to learn that, far from relying upon "rule of thumb," American manufacturers appreciate fully the value of scientific investigation as a guide in their work.

Representatives of the manufacturing interests of the country ask that there may be no extra session of Congress. The general cry is "Oh, don't." It might be an advantage to have action taken on some of the bills left unfinished. On the other hand, the distraction and turmoil occasioned by proceedings at Washington are a constant source of anxiety, productive of incalculable mischief. In important lines of industry, values must be wholly unsettled so long as agitation continues.

Little sympathy is felt for the National banks that are unable to recover their circulation, surrendered under the Funding Bill excitement. The law says the notes thus redeemed by the Treasury Department must be destroyed. To leave it optional with the banks to back and fill by turns—increasing and contracting their circulation at will—would be to place the business interests of the country at the mercy of unprincipled speculators.

Business men everywhere will feel gratified by the promotion of Assistant Postmaster Henry G. Pearson to the position made vacant by the appointment of Mr. James to a place in President Garfield's cabinet. Our large mercantile houses are well aware of Mr. Pearson's special fitness for the postmaster's chair, for to rare qualifications he adds the experience gained by familiarity with all the details of postal management.

#### WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., March 15, 1881.  
PRESIDENT GARFIELD AND THE COBDEN CLUB.  
President Garfield, referring again to the Cobden Club letter, says that the letter contains nothing that he would not, with perfect willingness, have given to the people, and as soon as he can get a little leisure he will have it transcribed from the notes of his stenographer. These are now at Mentor, but are readily accessible. The President says that the letter is in harmony with the spirit and letter of all his speeches. That in these he has always favored the broadest discussion of all economic questions, so that they might be fully understood by legislators and people; that by this course the proper results are sure to be reached. The President disclaims any such sentiments as are credited to him by the London *Telegraph* in the following announcement: "We understand that President Garfield has lately written a letter to the Secretary of the Cobden Club, in which, while expressing his inability, for various patriotic reasons, to carry out all the principles of the club, he approves of all possible ventilation of the subject of free trade." The statement about ventilation of the subject of free trade is evidently a distortion of the mention in his letter that he should like to see the questions of tariff and free trade, as all other great questions, freely discussed.

#### AN EXTRA SESSION IMPROBABLE.

The President, in conversation with your correspondent to-day, rather intimated that the agitations and uneasiness created in business circles by the uncertainty of legislation, had brought him to the determination that an extra session of Congress would not be desirable; that the unplaced 4 per cents would shortly mature; that this would be about as much as could be done between this and the regular session, and at that time a funding bill could be passed at such a rate as Congress might determine. The President has had no time, on account of the pressure of office-seekers, to give the attention he desires to public affairs, and to have Congress here before December he would certainly have his hands full.

Mr. Alex. Laughlin, Jr.—The many friends of Mr. Alexander Laughlin, Jr., of Pittsburgh, Pa., will hear with sincere sorrow of his death, which occurred at his home on the afternoon of March 11. Mr. Laughlin had been ill for some months with laryngitis, and for the past four months was confined to his house, but he was supposed to be improving, and, for the first time in some weeks, went out for a short ride last Thursday. The improvement was deceptive, however, and on Friday he passed quietly away. Mr. Laughlin was in the 35th year of his age. He was born in Evansville, Ind., graduated at Washington College, Pa., in 1863, and immediately entered into the service of the firm of Jones & Laughlin, of which his uncle, Mr. James Laughlin, is one of the senior partners. His first position was that of shipping clerk, then invoice clerk, and finally a partner, with the charge of one of the most important parts of the business of the firm. This latter position brought him into contact with the members of the iron trade all over the country, and his manly, generous, impulsive nature soon endeared him to all with whom he came into contact. As a business man his perception was quick and his decision ready, and these, combined with energy and tact, gave promise of an active, successful career. Mr. Laughlin was married four years ago to a daughter of Mr. B. F. Jones, the senior member of the firm, and leaves two bright little girls. All who knew "Alex. Laughlin," as his friends called him, will give their heartfelt sympathy to these three who are so deeply bereaved.

#### Chemical Specialists.

We print, by permission of the writer, the following interesting letter from Prof. Henry Wurtz, which, while not seeming to us to bear directly upon the question that suggested it, and which has been a matter of private correspondence and conference, touches a point which will be the better for a little ventilation:

To the Editor of *The Iron Age*.—DEAR SIR: The questions involved in and arising out of the discussion in your journal upon "The Institute and the Chemists," are among the most important that could be agitated. Nor is their importance, though very timely, at all ephemeral. You yourself say, with strict justice, that "chemistry has led the world's progress for half a century, and will lead it with still more rapid strides during the next half century." These questions cannot be adequately touched upon in a brief note. I will, however, in a few words as I find practicable, submit a small number of the ideas recalled to my mind by this discussion—ideas familiar to me for many years. I find myself in the happy position of being able to agree substantially with all that has been said so far in this discussion, both by yourself and your (assumed) opponents. To explain, I think if you will draw a distinction between chemistry, the science, and chemists, popularly so called, a large part of your own remarks may be measurably reconcilable with others that have been made. I understand the spirit of the letters of Mr. Hunt and Capt. Jones to be a protest against the acceptance, as data for generalization—that is, for the support of general principles—of analytical figures having a special origin and as yet unverified from other sources. Both gentlemen disclaim any pointed or personal reference to Dr. Dudley or his assistants. I, also, to avert misunderstanding, would disclaim all reference to individuals, my views being general and broad in their bearing.

The animus of your own remarks, as I take them, is an earnest protest against the disparagement which you deem likely to result, in the popular mind, of chemistry as an applied science, more especially as applied to the great and varied arts of metallurgy. I cannot believe that any real popular contempt for the science of chemistry can thus be propagated or fomented, even among practical iron and steel men. The demonstrations are too numerous, recent and complete, of the successful utilization of established chemical principles in siderurgy.

When we leave out of consideration, however, the grand science, and come down to the art of chemical analysis, which, like chemical siderurgy, is itself only a branch of applied chemistry, and view the present status of this art in point of fact, as well as in public estimation, it is undeniable that the disquietude you have expressed regarding this sort of controversy, as to "its influence in shaping the opinions of the class of so-called 'practical men' who manage our metallurgical industries," is justifiable to a large extent. What I mean is that, though chemistry is still held in esteem, no doubt, by all men of intelligence, chemists (so-called) are not so held, or certainly are held, as a rule, in far lower esteem than has been the case in the past; and that this is a growing tendency in the American mind, which may—and, indeed, does—work more or less harm at the present time. The recent imbroglio in the Institute was a manifestation, though by no means a wholesome or dignified one, of this popular feeling. It appears to me a fortunate circumstance that the incident of a trade question—between hard and soft metal for rails—should have brought this feeling out to the light of day, as nothing can be done even to trace, much less to stem, such currents so long as they flow altogether beneath the surface.

That anything can be effected, at short notice, to modify public opinion regarding what an eminent member of your editorial fraternity has recently, in discussing the Institute affair, designated as "alleged chemists," it would of course be absurd to expect. Indeed the only way to reform public opinion is generally found, in such cases, to be a reformation of the subject of that opinion. It will, however, be useful to all of us if we can, in the first place, agree upon the reason why the public has taken up the idea so tersely conveyed by the term "alleged chemists." I shall, therefore, venture, with all humility, to put forth my own individual views upon this head, conscious that they involve much heterodoxy (as the world wags now), and expectant, therefore, of little else than malediction, or at best disregard. I have, however, lived already long enough to have found my own heterodoxies, in some cases, become matters of general acceptance, and even to be claimed as great and original discoveries by others.

My own belief is, that the pending mischief to science—or rather to scientists, for science can only be retarded—has resulted from the introduction, during the generation last past, of the specialistic systems of education. Specialism—which is only a compromise with practicalism, our former tyrant—now rules us all, and we already have some of the results. Confining myself just now to chemical matters, one outgrowth of this system has been the establishment of chemical schools, where analytical chemistry is taught, not, as it should be, as an applied science, or an "art," as I have called it above, but rather as a special practice or trade, or means of gaining a professional livelihood—a "royal road" to position and prosperity. Hence it is reduced to as "practical" a form as possible, and is split up into narrow specialties, such as iron and steel chemistry, sugar chemistry, gas chemistry, agricultural chemistry, and so forth. As aforesaid, this is a compromise with the views of "practical men," and jumps with their humor acceptably. Men engaged in industrial pursuits, therefore, naturally resort to such schools for scientific aid, and what they get thereby is now beginning to be matter of public experience and realization. A graduate from a school in which analytical chemistry is ostensibly taught, is naturally assumed, and even "alleged" to be an analytical chemist. My own observation and experience, however, are to the effect that after such graduation, ten years of diligent, varied and faithful laboratory work would not be too adequate a further preparation for entering con-

scientiously upon the pursuit of a specialty in applied chemistry. Iron and steel chemistry, as now developed, I would make an eminent case in point. Of course, this preposterous view of mine, if accepted, would debar most young men from making a trade of chemical siderurgy. I am, however, of experience enough to know, and bigoted enough to believe, that science should not, indeed cannot, be converted into a trade without losing certain of its essentialities, and becoming, as it does, a worthy subject of popular disparagement.

Another of my heterodoxies, founded also on observation, is the belief that to be a true specialist, in the scientific sense, requires that a man should be previously pre-eminently thorough as a generalist; in other words, that each specialty is so intimately interwoven and inter-ramified with every other, and is liable to develop circumstances dependent on others, that the narrow specialist, whether of the chemical or any other species, is sure to find himself often involved in such manner that guesswork or empiricism must be his only resort. This principle is well recognized in medical science. It must be quite as true, if not much more so, of the far younger, but much more exact and expanded, chemical sciences.

I see, Mr. Editor, that my "brief note," at this rate, is likely to occupy your whole issue, and, as I have as yet only skimmed over a few preliminary points of the great subject, I must hope for a future opportunity, if anybody is interested in following up the discussion from my point of view.

Respectfully, HENRY WURTZ,  
25 London Terrace, New York City, March 14, 1881.

#### Cast Iron vs. Fire Brick Stoves.

To the Editor of *The Iron Age*.—DEAR SIR: In your issue of March 10th, I find Mr. Birkinbine's remarks on my paper, "The Whitwell Stove and Its Recent Improvements." As you state, my paper was read on the last afternoon of the meeting, when a full discussion was impossible. Besides, there were members there with papers whose patience had been overtaxed waiting the termination of that valuable discussion on steel rails. This must be my excuse for not having answered him at the meeting.

Mr. Birkinbine wishes to challenge my statement that "the Whitwell stoves augment the product of a given plant from 60 to 70 per cent." I think, had he asked for information leading to that inference, and then challenged that, it would have been more to the point. He claims not to be familiar with coke practice, but his ignorance of that work must not exclude facts from being brought forward, nor must he deny simply because he does not know. The only furnaces in blast in the anthracite region having the Whitwell stove are: The Cedar Point Iron Co., 1 furnace, 4 stoves; The Crane Iron Works, 2 furnaces, 6 stoves; The Pennsylvania Steel Co., 1 furnace, 3 stoves; The Paxton Furnaces, 1 furnace, 3 stoves.

The Cedar Point, when compared with the Scranton, showing no perceptible difference in favor of the Cedar Point, really demonstrates the latter's superiority, as the Scranton people, being the purchasers, invariably obtain the best selections of the ore. The Crane Iron Company have had a small plant at one furnace for a number of years, but I have no data from their work; indeed, I do not expect anything great, as the stoves are not large enough. I hope for good results from the last plant put in. The fact, however, that after three years' work with the small stoves, the owners were so well pleased as to erect six more stoves between last year and this, is a very strong recommendation in their favor.

The Pennsylvania Steel Works have had one plant at work since 1877, and though the stoves were small, their work induced the erection of six more this year. I obtained a record from the books, which showed that for one month they made 2060 tons iron with 2064 tons of fuel, and for the next 2111 tons with 2166 tons of fuel. The furnace has a 17-foot bosh. I do not know the height, but consider this excellent work.

The Paxton furnaces, Harrisburgh, Pa., put up three stoves in 1879, and their superintendent, writes thus: "Our furnace is going all right. We are making 65 to 70 tons per day now on the same stock that we used with iron stoves, and thought we were doing much when we got 40 to 42 tons with 1½ tons coal. Now we are using a trifle less than 1 gross ton." They are putting up a second plant at their No. 2 furnace and tearing down a good set of iron ovens to do it.

Turning now to the coke practice, I will merely refer to two places. At the Isabella Furnace Co.'s plant there are two furnaces—one with cast-iron stoves, the other with Whitwell's stoves. Both have a 20-foot bosh—the former makes 75 tons of iron per day, the latter 150 tons, and would produce more if it could be filled, the hoist not being of sufficient capacity.

The Nesheannock Iron Co., New Castle, Pa., have a small 6500-foot furnace. With the same stock, the same furnace, the same small machinery, &c., but changing from 800° to 1300° F., the make was augmented from 40 to 85 tons per day, and the fuel consumption fell from 1.50 to 1.17.

That some modifications of the furnace interior may have largely increased the amount of iron per day for a short blast, as at the Warwick, I do not doubt, yet I have no proof that it did it economically, rather the reverse. It has long been acknowledged that large hearths are conducive to large make, but when not supported with reliable air heaters there is danger of getting into amazing troubles. I have not the least doubt that the Warwick, or the other furnaces referred to, the Pottstown Iron Company and the North Lebanon Furnaces, with their large hearths, would continue to do well with good Whitwell stoves, as when their inevitable troubles come they can depend on an immense volume of heat stored up in the brick to carry them through. It does not matter about the height of hearth, or where the bosh tapers is; it is only the large zone of combustion especially required in anthracite furnaces, that gives these furnaces any merit over their neighbors.

One word about durability. Surely one

cannot for a moment expect to maintain that cast iron has the refractory power of fire-brick. Whitwell's stoves heat the blast to 1400° F., without the least injury. No cast pipe stove can maintain 900° F. for any considerable time—care or no care. The proprietor who had his cast stoves since 1860 and had never replaced a pipe, never carried and maintained over 600° F. in his blast. This any furnaceman will at once conclude without knowing any of the facts. Surely Mr. Birkinbine will not allow any one to think that he believes 600° from cast-iron pipe equal to 1300° from fire-brick. He says he never saw a cast pipe burned out. Neither did I, but I know that the iron will rapidly oxidize at 800° to 900°, both inside and outside the pipes, and enlarging by oxidation will soon crack the remaining metal. Currents of air to cool off pipe stoves are not allowed to enter by any of our friends. They have more respect for their property and know enough not to do such things. One-half century has been spent in making pipe stoves of all imaginable forms, horizontal, perpendicular and hanging pipes, and yet they fail to maintain more than a moderate heat. If furnacemen are content with 800° F., they can with care maintain that with cast-iron heaters and not have any great expense, and if that heat is enough a small plant of Whitwell stoves at about the same cost will be better than the cast-iron pipes. But if heat above this point is wanted, cast-iron heaters must be abandoned and a more refractory material used.

FRED. W. GORDON.  
PITTSBURGH, March 14, 1881.

#### Can the Magnetism of Iron and Steel be Used to Determine Their Physical Properties?

BY WILLIAM METCALF.

One of the first questions that naturally occurs to a handler of steel is: Why does steel harden? This question seized upon the writer many years ago, and, with the enthusiastic zeal of a profound ignorance, he undertook its immediate solution. It was merely to hand a chemist a piece of hardened steel and of unhardened steel from the same bar, and ask him: "What is the difference between these two?" The answer came as readily: "One has its carbon all combined and the other contains its carbon all uncombined." This was clear, but there was a whole lot of things for which this answer hardly accounted; yet it may be the true solution, for all we know to the contrary. Further investigation seemed necessary, and the aid of the microscopist was sought, but he said: "It is of no use; we cannot magnify the perspective of a body, and, therefore, we cannot hope to detect minute differences of crystalline form such as seem to be offered in this case."

Then, having observed Prof. Frazier's beautiful experiments with the polarizer, exhibited to the Institute during the Centennial meeting in this city, the idea was conceived of making thin specimens of coarse graphitic cast iron and of the same iron chilled, so as to determine whether the chill contained crystalline carbon or little diamonds. The case was stated to Prof. Frazier, and he immediately replied that the suggestion was ingenious, and that his instruments and his services were at the disposal of any one who would furnish the plates, adding, in his customary urbane manner, that there might be a slight difficulty, inasmuch as, so far as he knew, graphite was absolutely opaque, and the diamond had no effect whatever upon the polarized light. Those specimens were never made. Specific gravities were then thoroughly examined by Prof. Langley, and he showed conclusively that the specific gravity decreases as the hardness increases, and that the ratio of decrease is directly as the quantity of carbon present, and that is all we know from that investigation. The next step occurred over in England. Some inquisitive native wrote to *Engineering* and asked why steel hardened. The next three or four numbers of *Engineering* were funnier than *Punch* ever attempted to be, and only one writer, of a dozen or so, offered a sensible reason; and that was, "that the hardness was due to tension caused by sudden cooling." This may be true, but it hardly explains all the facts connected with hardening.

About this time the distinguished Prof. Akerman, of Stockholm, sent a long and able paper on the same subject to the British Iron and Steel Institute. He claimed that the carbon existed in two conditions, which he called the non-hardening carbon and the hardening carbon. There was no nonsense in Prof. Akerman's paper, neither was there any clear proof, such as would have been had by the separation and identification of these two kinds of carbon. Therefore, we must leave the subject where he left it, in the region of reasonable hypothesis—not proven.

There is still another line of examination open to us, which, so far as I know, is entirely unexplored in this connection, and it is the object of this paper, more particularly, to call attention to this field, in the hope that some one having the time and the ability will take up the matter and explore it thoroughly. I refer to magnetism. There are so many parallels between the action of magnetism on iron or steel, and the action of iron or steel under different processes of manipulation, that it would seem as if there must be some connection between the forces at work in the different cases, if, indeed, there be not an identity of force in all these cases—of which magnetism, as we know it, is a mere visible manifestation—which may serve as a guide to lead us to an exact knowledge of the structure, the strains and the resistances with which we have to deal so largely in iron and steel. If a magnet is brought close to a pile of iron filings the little pieces of iron will fly to the magnet and attach themselves to it, with their longer axes lying in the direction of the force. If molten cast iron be poured into a chill, the iron upon crystallizing will form in long, needle-like crystals, the long axes of which are normal to the surfaces of the mold. If the iron be of the proper temperature, and the quantity be small com-

\* A paper read before the American Institute of Mining Engineers.

pared to the mass of the mold, the whole of it will be chilled or set in the hard, needle-like crystals just mentioned. If the mass of molten iron be comparatively large, only a part of the mass next to the surface will be chilled, and near to the inner edge of the chilled part will be found numerous specks of graphite, which have the appearance of having been driven out in the operation of chilling. The mold in this case may not be a magnet, though it acts like one. The chill, in resistance to compression or abrasion, has enormous strength, as may be seen by the thousands of miles run by chilled car wheels, or in the case of the hammer die, which will resist millions of blows upon steel which is often hammered until it is black and very hard. The same structure may be observed in ingots of steel when they are in the condition which the melters call "scalded"—in reality, when they are chilled. A better name, perhaps, and one much in use, is "polarized ingots," and for the present we will use this term. A polarized ingot looks very much like chilled cast iron, and, like chilled iron, it breaks very easily along the planes of cleavage parallel to the axes of the crystals. Like chilled iron, polarized steel may be reduced to an entirely amorphous arrangement of crystals by a good red heat, continued for some hours, to give the crystals time to rearrange or disarrange themselves. Unlike chilled iron, polarized steel is not hard, offers no great resistance to any strains and has no industrial value. This is due, doubtless, to an insufficiency of carbon. There is a similar, but not an identical, polarization of crystals dispersed through the mass of steel ingots, which appear when there is a certain quantity of carbon present, and above and below a small range of carbon this polarization disappears or changes its character. I shall refer to this later. If a piece of soft iron or of mild steel be heated and quenched in water, it will not harden. If the same pieces be magnetized, they will not retain the magnetism. If the iron be converted into very hard blister steel and worked into shear steel, it will harden; and then, if magnetized, it will retain its magnetism, and the mild steel could be converted in the same way. If a permanent magnet be heated, it will lose its magnetism as the temperature is raised and regain it as the temperature is lowered. If the magnet be heated white hot, or to a high yellow heat, it will lose its magnetism entirely, and also, at the same heat, the steel will lose its temper. If pieces of steel of, say, 0.40, 0.50, 0.60, 0.70, 0.80, 0.90, 1.00, 1.10, &c., carbon be sent to the magnet maker for trial, he will invariably select samples containing about 0.90 carbon as giving the best results. If tables of physical tests of steel be examined—and, notably, Kirkaldy's tests of Fagersta steel—the highest resistance to all strains except compression will be found at about 0.90 carbon.

If the polarization before referred to as not due to chilling, be examined, its most perfect development will be found at about 0.90 carbon. If the great majority of all steels as adapted to the greatest variety of uses, and giving the highest results as to strength, retention of a keen edge, &c., be examined, they will be found to be about 0.90 carbon.

A bar of hardened steel, when magnetized, retains its magnetism indefinitely; and the magnet may be loaded far beyond its original capacity by the addition of a small weight day by day, but this increased capacity is lost immediately if the load be removed. Similarly, the elastic limit of iron or steel may be raised by repeated straining between the limits of elasticity and rupture, as has been proved by Prof. Thurston; but he has not shown that there is any reliable permanent increase of the limit of elasticity which would justify an engineer in taking advantage of this apparent increase of strength.

There seems to be a connection between paramagnetics, dia-magnetics and the character of alloys of iron containing them. For instance, we have among the para-magnetics iron, nickel, cobalt, manganese, chromium, titanium, cerium, palladium, platinum, osmium and oxygen. Among the dia-magnetics we have bismuth, antimony, lead, tin, mercury, gold, silver, zinc, copper, glass, phosphorus, sulphur, mercury and jet. As far as ordinary experience or the records teach us, every one of the above paramagnetics, except oxygen, will form useful alloys with iron; and, on the other hand, not one of the dia-magnetics named, except carbon, forms any useful alloy, and most of them are rank poisons in steel. The first lists obtained did not contain oxygen or carbon, and the writer very nearly made the wonderful discovery that all para-magnetics are useful and permissible in steel, and that all dia-magnetics are hurtful and ought not to be contained in steel. Further search brought out the fact that oxygen is paramagnetic; but nothing could be learned about carbon until a final appeal was made to our ever-ready secretary, Dr. Brown, who dug out the fact that jet is dia-magnetic. It seems a little singular that all of the books do not give the magnetic properties of carbon in all its forms. In the light of the two instances of contrariness just given, the announcement of the above discovery is deferred.

An investigation, by means of magnetism, seems justifiable on other grounds. If a piece of steel be powerfully magnetized it is found to be lengthened in the direction of the force and reduced in the section in a direction perpendicular to the force. Here, then, is a change of form, but no change of volume. Reduced to common language, we have extension of length and reduction of area, and the application of a force in the easiest manner which, measured in the ordinary way on a bar 1 inch square, would represent the application of a strain of something over 50,000 pounds. If a bar of steel be magnetized suddenly, a click is heard at the beginning and the end of the operation. Who will assert that a bar might not be actually ruptured in this way, as well as by awkward management in quenching it to harden it?

A magnetic needle is said to be in common use in Woolwich Arsenal for the detection of flaws in iron and steel; and a very ingenious instrument was described before this institute for determining the carbon in



steel by means of magnetic deflections. The latter instrument may not be exact enough in carbon determinations, but it might be made very useful in helping to determine total quantities of iron and substances not iron, or possibly to determine the totals of para-magnetics and dia-magnetics present in a given specimen.

Ingenuity and search might point out many more comparisons, but surely enough has been shown to justify the assertion that it would be well worth while to investigate the subject thoroughly. If a little needle will point out every defect in the interior of a huge forging; if a delicate pendulum will indicate quantities of iron and substances not iron; if an obedient force, held in a little instrument in one hand, may be made to produce an effect in a piece of steel passed over it in the other hand equal to a strain of more than 50,000 pounds, who will say that the great Emery testing machine may not some day be declared a very cumbersome and unnecessary thing? Is it not possible that the engineer of the future will carry with him in a grip-sack, all of the tools necessary to tell him all he needs to know about the material he is getting for his structures? The phenomenon of "consequent points" ought not to be overlooked, as it is more than probable that they are due either to internal defects or injurious local strains.

Finally, I appeal to Dr. Dudley and all such investigators as he, who have the time and ability to work out this matter to the end—and if the end should be nothing there would be nothing lost, for then we could turn our attention to some other side of the question. I appeal to Dr. Dudley more particularly, because he has already shown himself to be a leading and active worker in a wise direction. Exact specifications within the limits of possibility and profit are far more satisfactory to work to than no specifications. I claim Dr. Dudley's attention a little farther, as he is the cause of the writing of this paper. He has introduced a term into his papers and specifications which, for the sake of the harmony of the world, ought to be obliterated. I refer to the word "hardener," and it was the search for a word to offer in place of it that nearly led to that remarkable discovery about para-magnetics and dia-magnetics. The word "hardener" is properly applied to any substance contained in steel, for anything mixed with iron will make it harder than iron; but carbon is a great hardener. It produces all of the wonderful and useful properties in steel with which we are familiar and of which we know so little. Carbon, then, should be distinguished as the hardener, and all other components should be known by some other name; if not, we shall have quack steel makers with more silicon steel, phosphorus steel, sulphur steel, &c. And why not? Are they not all hardeners, and is any one better than another? This is serious, for we have too much duplication of meanings now. For instance, you go to a founder and ask if he has a chill to make a certain size of die or roll; he replies yes, and asks how much chill you want, and you tell him you want half an inch or an inch, as the case may be. Then he asks you if you want a tough chill, or a mild chill, or a hard chill, and you tell him and walk off, and any outsider would be utterly puzzled to know what a chill was. You had talked of two entirely different things and called them by the same name.

A steel maker talks of temper, and refers to steel of 0.30 C., 0.40 C. or 1.00 C., as it may happen; and a steel user talks of temper and means a yellow or brown or blue color left on his steel after it is tempered. This works beautifully. I once traveled many hundreds of miles to see about a steel trouble. The man in trouble had sent back a shear knife which would not cut. Not waiting for that I started off, and asked my partner to wire me his opinion after he had received this shear blade; we were both sure it had been burned. After my arrival on the scene and finding a man in real trouble and a great temper, a message came in these words: "Temper too high, will send another bar." Greatly pleased and thinking my way easy, in an evil moment I showed the message to my friend. The storm of wrath that fell on my head was perfectly appalling. If I had come all that way to tell him he didn't know how to temper a shear knife, I had better get out and go home. Did I think he was a fool that he could be publicly insulted in that way over the telegraph wires? The next thing, he supposed, would be a report to his superior, that he did not know how to temper and had better be dismissed. That man simply did not know our meaning of the word temper, and it took just two days to draw his temper and talk him into a good humor.

Then, who can define steel? An international committee, this great institute and many others wrestled with the question, and to-day there is a heavy suit pending in the United States court, all turning upon the question whether steel is steel or iron. Now we are threatened with the war of the "hardeners," and the contemplation of another complication in our nomenclature is no joke for the steel makers, and in their behalf I appeal to Dr. Dudley to relieve us before it is too late.

A suit was commenced in Marquette, Mich., a few days ago, against Samuel J. Tilden, on complaint of J. M. Wilkinson, assignee of William L. Wetmore, bankrupt, to recover the profits of an alleged partnership, formed in 1863, to carry on the business of mining, transporting and selling iron ore. For the defense it is alleged that Wetmore was merely an agent, and that by his own confession he issued fraudulent paper, which has been decided to be such by the Supreme Court of Michigan; that, in truth, Wetmore is indebted to Tilden for money advanced, &c.

The advocates of the entire abolition of westward tolls on the Erie Canal won a complete victory in the Canal Board on Tuesday, the vote standing 6 to 1.

The elevated railroad officers are directed by the New York Board of Aldermen to put a lamp on their structures at the intersection of each cross street.

### The Springfield Iron Company and Its Workmen.

The Springfield Iron Co., to set itself right in a wages dispute, has published the following very interesting circular:

To the Employees of the Springfield Iron Company: A controversy has arisen between the company and the heaters and roll hands which has caused the stoppage of the rail mill and the blooming mill. The point at issue is the rate of wages to be paid in those mills for the year to come. The men demand an increase of 7 per cent. for heating iron rail piles, and of 2½ cents per ton for heating steel for rails. They also demand 30 cents per ton for heating in the blooming mill. The company has offered to advance the wages for heating iron rail piles to 50 cents per ton, but has refused to advance the rates on steel, and has asked to have the question as to rates in the blooming mill postponed until the rail mill questions are settled, neither acceding to nor denying the demands of the men as to the rate to be paid. The controversy thus appears to be in regard to the rate for heating, but the roll hands' wages are back of that, and dependent upon it, and hence they join in the demand of the heaters.

The company desire to place before their other employees the facts in the case, and a statement of their position in the matter.

First of all, it may be said that the wages of the heaters and roll hands are the highest paid in the mill, and it seems to the company that, taking into consideration the time they are called upon to work, the amount of physical effort which they have to put forth, the skill employed, the time spent in learning the trade—if trade it can be called—and the amount of responsibility which they assume, that these men are paid more in proportion than the machinists, engineers, firemen, helpers, or any other men in the employment of the company. In support of this idea the following statement shows the amount actually earned by the men employed at the old wages in the month of January, at the different jobs named:

Job.	Rate per ton.	Wages per ton.
Heater, 1st shift, 12 hrs.	40.00	4.00
Heater, 2nd shift, 12 hrs.	40.00	4.00
Heater, 3rd shift, 12 hrs.	40.00	4.00
Roll hand, 1st shift, 12 hrs.	30.00	3.00
Roll hand, 2nd shift, 12 hrs.	30.00	3.00
Roll hand, 3rd shift, 12 hrs.	30.00	3.00
Heater, 1st shift, 10 hrs.	30.00	3.00
Heater, 2nd shift, 10 hrs.	30.00	3.00
Heater, 3rd shift, 10 hrs.	30.00	3.00
Roll hand, 1st shift, 10 hrs.	20.00	2.00
Roll hand, 2nd shift, 10 hrs.	20.00	2.00
Roll hand, 3rd shift, 10 hrs.	20.00	2.00
Heater, 1st shift, 8 hrs.	20.00	2.00
Heater, 2nd shift, 8 hrs.	20.00	2.00
Heater, 3rd shift, 8 hrs.	20.00	2.00
Roll hand, 1st shift, 8 hrs.	15.00	1.50
Roll hand, 2nd shift, 8 hrs.	15.00	1.50
Roll hand, 3rd shift, 8 hrs.	15.00	1.50
Heater, 1st shift, 6 hrs.	15.00	1.50
Heater, 2nd shift, 6 hrs.	15.00	1.50
Heater, 3rd shift, 6 hrs.	15.00	1.50
Roll hand, 1st shift, 6 hrs.	10.00	1.00
Roll hand, 2nd shift, 6 hrs.	10.00	1.00
Roll hand, 3rd shift, 6 hrs.	10.00	1.00
Heater, 1st shift, 4 hrs.	10.00	1.00
Heater, 2nd shift, 4 hrs.	10.00	1.00
Heater, 3rd shift, 4 hrs.	10.00	1.00
Roll hand, 1st shift, 4 hrs.	5.00	.50
Roll hand, 2nd shift, 4 hrs.	5.00	.50
Roll hand, 3rd shift, 4 hrs.	5.00	.50

The wages on steel were much lower than the average, by reason of frequent breakages of the machinery at the rolls. The wages earned by James Milbee, a roller working on steel at the present wages, on March 1st, 2d and 3d, averaged \$15.25 per day, and the company paid a man \$2 per day besides for "sticking in" for him. The amount earned on those same days by Thomas Young, heater, was \$6.25 per day; by Martin Gallaher, \$6.25; and by Henry Charles, \$5.80. Yet this is the class of men who are not satisfied with their pay, and who strike and throw all of their fellow employees out of employment, and inflict heavy losses upon their employers as well. They also get an allowance for their support while the strike lasts, which the other men do not.

It is submitted that any good machinist can learn in three months to take care of a train of rail rolls, and to judge of the heat at which it is safe to allow either iron or steel to enter the rolls. Every one of you has probably seen the half-grown son of Llewellyn Williams doing the rollers' work, and doing it well. It is also submitted that any intelligent laborer can learn to heat and manage one of our heating furnaces in a very few months, and that the work is so light compared to what it was before our labor-saving appliances were introduced, that the heaters themselves consider their jobs almost in the light of pensions. Then what reason can there be for such a difference between the wages of these men and everybody else?

It is also submitted that heretofore in making up the wages to be paid the heaters and roll hands at our works, an effort has been made to have them approximate to those paid in other works of the same kind in our neighborhood. Iron rails are now made only at Columbus, Ohio, Indianapolis and New Albany, Indiana, and at the works of the North Chicago Rolling Mill Company. The wages now paid for heating iron rail piles at Columbus, Indianapolis and New Albany are 45 cents per ton. At North Chicago the rate is 1 per cent. of the selling price of rails, which is estimated for the year 1881 at \$50 per ton, making the wages for heating 50 cents per ton. Our offer is to advance our price from 45 cents and make it 50 cents per ton, which is thus equal to the highest wages paid at any of the works by which we have heretofore been guided.

Steel rails are made from cold steel blooms in but three works in the country besides ours, viz: At Troy, at the Superior Mill, Pittsburgh, and at Joliet. The wages paid heaters at Troy are 32 2-10 cents per ton; at Pittsburgh, they have been, and are the same that we are paying, and the heaters at Joliet have just engaged at the same price for the year 1881, viz: 40½ cents per ton on rails of 50 pounds per yard or over, which we make 45 cents per ton on rails of 30 and 35 pounds per yard. It will thus be seen that we are paying the top price for this work, and as the output of our works exceeds that of any of the others on this kind

of work, it will be seen that the roll hands, at any rate, make more money than any of the other roll hands. Besides this, it is well known to our employees that we have a great many difficulties to contend with in our steel furnaces, and that the steel made so far has been productive of a loss. It is, therefore, hard to understand why our men should insist on handicapping us in the matter of wages in the competition that we have to meet with in securing orders.

Taking this view of the situation, the company has resolved to rid itself of the tyranny of the trades unions, and henceforth it will be made a condition of employment that no man shall belong to any such organization while in the employ of the company. Fair wages will at all times be paid to every man in our employ, but they shall be regulated by agreement between the company and the parties concerned, and without outside aid or interference. Men are wanted to take the jobs at the rolls and at the furnaces, and the company invites any men now or heretofore in its employ who desire to continue to work, to let it be known to the superintendent. If any men now working as helpers at furnaces desire to be promoted, or if any working at other jobs have worked at the rolls and want employment there, their cases will receive due consideration.

The company can but express its sincere regret at the course things have taken. Many of the men involved in this trouble are well known to all of the officers, and have worked for the company for years. They had constant employment through all the dark days following the panic of 1873, and have been greatly more profited by the operations of the company than have its stockholders. Still, there seems no other course open to the company than the one laid down, and it will be followed to the end.

By order of the Board of Directors,  
CHAS. RIDGELY, President.  
Springfield, Ill., March 7, 1881.

### A New American-built Steamship.

A new iron steamship which has just been built at Chester, Pa., by John Roach & Son, for the Oregon Improvement Company, arrived here recently and is lying at the foot of Ninth street, East River. The vessel is called the Willamette. She will be used principally for freight, and, consequently, she has in some respects been built differently from most of the steamers which have been launched at Roach & Son's yard. Her decks, fore and aft, are guarded by high iron bulwarks, while at the forward end is the forecastle, which is covered by a high topgallant forecastle, like the average British freight steamship. The Willamette is one of the largest, if not the largest, of freight steamships which has been built in this country for years. Her dimensions are: Length, 335 feet; breadth of beam, 40 feet; depth of hold, 25 feet, and measurement, 3500 tons. The between decks are of iron, and the vessel is calculated to carry deck loads also. She has the capacity for some 3000 tons of freight. She has compound engines with cylinders 38 and 74 inches in diameter, respectively, and a piston stroke of 54 inches. Although she is to be used chiefly for freight, she will have well-fitted-up quarters for 40 passengers. There is a large deck-house amidships, and on this is placed the pilot-house, just aft of which is the captain's room. The lifeboats are amidships on either side. The Willamette is schooner-rigged, and contains all the latest steam-working appliances. She will be ready to sail for San Francisco in about twelve days. She will ply regularly between that port and Seattle, Washington Territory.

Reckless Business Methods.—The hardware dealers of Montreal are much excited over the recent failure of W. & F. L. Currie & Co., who are alleged to have been doing a business of \$1,500,000 per annum, on a capital of \$184,000, and to have systematically sold goods at a loss. The statement submitted to a meeting of creditors on the 5th inst., by Mr. P. S. Ross, is as follows: Total liabilities, \$384,811, which included: Open accounts, \$37,286; bills payable, \$328,792; Dominion Paper Company, \$4929; estimated loss on bills receivable, \$20,000. Total assets, \$254,523, which included: Real estate, \$3210; mill property, \$125,000; stock on hand, \$73,000. This would leave, Mr. Ross said, a deficiency of a little over \$130,000. On being called on to explain how so large a loss had accrued, when it was represented that only a year ago the firm had made a considerable profit, Mr. Ross said the balance sheet of the firm showed on Dec. 31, 1879, capital, \$184,356. It was also shown that a profit had been made out of the paper mills last year of over \$30,000. The losses, however, on goods sold last year amounted to \$201,000. The expenses of the establishment amounted to \$30,000, and interest to \$27,000. The total sales of the firm in 1880 amounted to over \$1,500,000. This last statement was received with considerable surprise. The amount of the firm's paper under discount in the Bank of Montreal is placed at \$320,000.

The Window Glass Trade.—The Pittsburgh Dispatch says: The window-glass association, at a recent meeting, fixed the discounts on car loads at 70 and 5 off. This, as will be seen, still leaves a small percentage of the list price for the manufacturers to buy boxes and pay workmen with. The glass men report trade at present exceedingly dull, and the smaller firms say this heavy and unusual discount was fixed for the purpose of freezing them out. If that is the case it seems to have proved futile, as the small firms are still holding on, and it is reported they have joined together in a determination to help each other out if there should be any danger of any of them being driven to the wall.

The Executive of the United States of Colombia has concluded a contract with the Central and South American Cable Company for a cable, north and south from the Isthmus of Panama, to connect with the United States and Europe by way of Central America and Mexico, as recently set forth in these columns.

## Providence Tool Co., PROVIDENCE, R. I.



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Improved Heart Clew.



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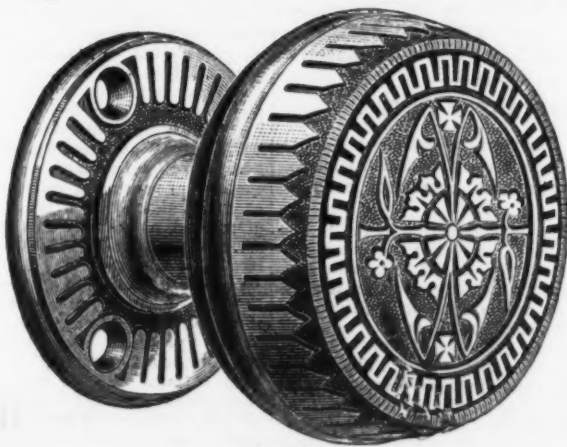
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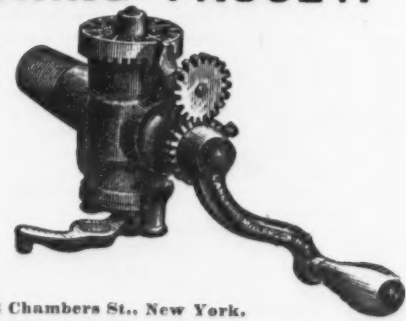
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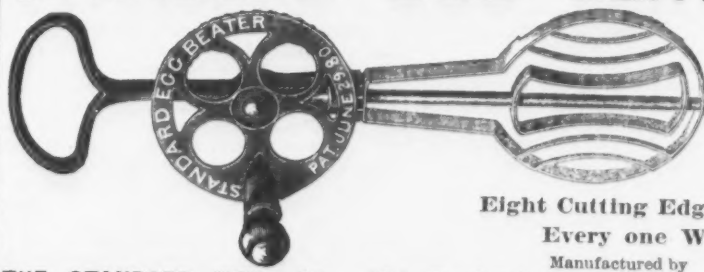
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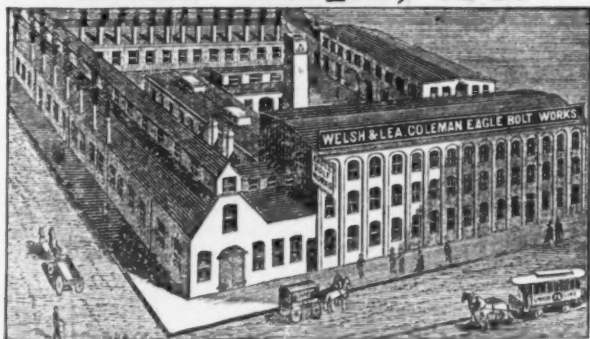


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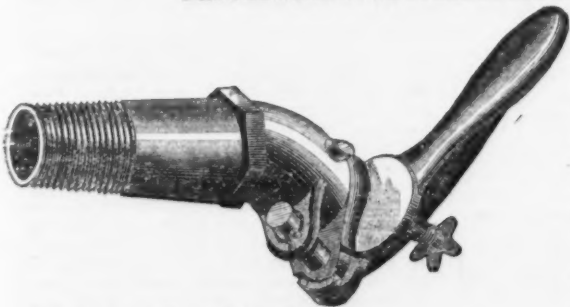
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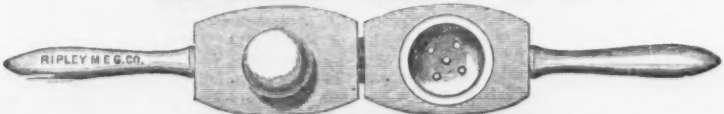


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SABIN'S LEVER DOOR SPRINGS, For heavy doors,  
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Send for Catalogue. Represented in New York by DAVID HYMES & CO., 92 Church St.**

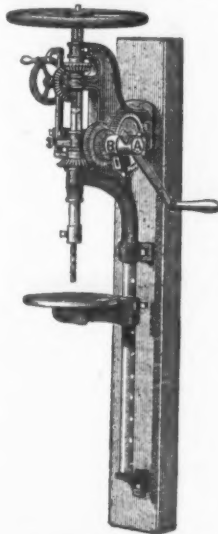
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double geared, so arranged that by moving the  
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MINES: Lehigh Valley, Pa. WORKS & FURNACES: Bergen Port, N. J.  
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**PURE  
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Superior for LIQUID PAINT on account of its body  
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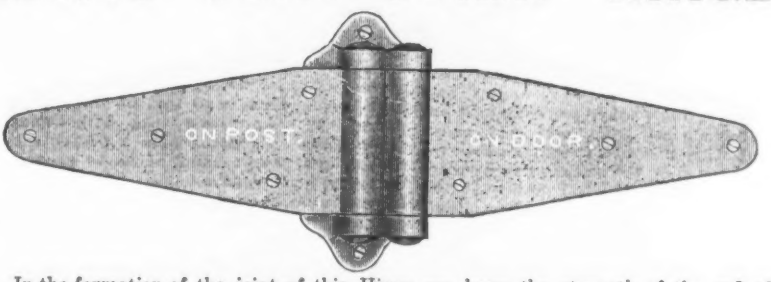


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**LEWIS' PAT. STRAP HINGE.**



In the formation of the joint of this Hinge we have the strength of the whole  
width of the strap, instead of one-third, as in the ordinary Hinge. The leaves and  
rivets are wrought iron, and the malleable parts on the sides (all of which have been  
tested) form a brace when secured to the post, thus giving additional strength; and as  
strength in a Hinge, rather than length of iron, is the main object, the patent  
is cheaper than the common. To avoid confusion, we number them as follows:  
Patent Extra Heavy.....No. 5 1/2 6 1/2 8 1/2 10 12  
Width of Strap at joint.....2 2 1/2 3 3 1/2 4 1/2  
They are three times stronger than the common 6 8 10 12 14 in.  
The numbers and length of the Patent Hinge are identical. We shall prepare a line of  
Heavy Strap, of same length, but one-half inch narrower than the extra heavy.

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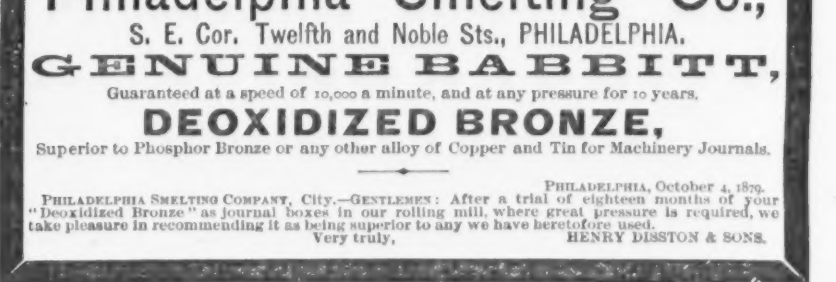
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DEOXIDIZED BRONZE,  
Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.**



PHILADELPHIA, October 4, 1890.  
GENTLEMEN: After a trial of eighteen months of your  
"Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we  
take pleasure in recommending it as being superior to any we have heretofore used.  
Very truly,  
HENRY DASTON & SONS.

**THE IDEAL COFFEE POT.**  
Patented July 21, 1886.

The engraving shows that the "Ideal" is the most perfect, simple  
and complete pot ever produced, and as such is the best selling pot  
in the market. It sells on its own merits. By its use the coffee is  
always regular, of the same quality, strength, and perfectly clear.  
A child can make better coffee in this pot than can an adult by the  
old method of boiling. It is without doubt the best pot in the world  
to day, and you can sell them. They are used and recommended by  
Mrs. President Hayes, Mrs. Bishop Simpson, Hon. John Jay, Gen. B.  
Flint, California, and by everybody who has used one.  
Prices: Polished Tin, per doz., 3 pt., \$7.50; 5 pt., \$10.00; 7 pt., \$11.25;  
9 pt., \$15. Nickel Silver, 3 pt., \$15; 5 pt., \$18.00; 7 pt., \$24; 9 pt., \$27.  
The nickel silver pots are nickel-plated outside and silver-plated in-  
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Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob  
RIGHT OR LEFT HAND.  
**PASSENGER CAR LOCKS, Bronzed, Nickel-Plated and Japanned.**  
Catalogues and Samples sent upon application. **BROOKLYN, N. Y.**

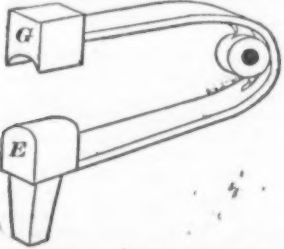




## Cornice Machine Litigation.

The following communication from Mr. George Hayes, which appeared in *The Metal Worker*, of March 12th, will be read with interest, as involving some very important mechanical questions and points in patent law.

To the Editor of *The Metal Worker*—DEAR SIR: In accordance with your request and the desire of Mr. Budd, whose letter appeared in your last issue, and very many others, I with pleasure submit further information touching the controversy between Mr. Fischer and myself. I desire at the outset to thank the many gentlemen who



Cornice Machine Litigation.—Fig. 1.—The Hollister, presumably the invention of Tubal Cain.

have become interested in this controversy, which involves a principle of vast importance to the manufacturing community generally. I sincerely trust and hope that my efforts in this direction will not be misunderstood or regarded in any sense as pugnacious. I am only fighting for justice, defending myself against heavy pecuniary damages, and endeavoring to set right a wrong that, if passed over, would promulgate a very serious precedent. I feel sure that if I succeed, and if it is shown that Mr. Fischer is wrong in claiming that which belongs justly to the public, my endeavors will be appreciated, not only by the general public, but by the court, for correcting its error. This will contribute much towards consolation for what I have suffered and which cannot ever be restored, viz., the indignities, the many sleepless nights, the worry and anxiety, and the many unpleasantnesses I have endured under and by reason of this terrible suit.

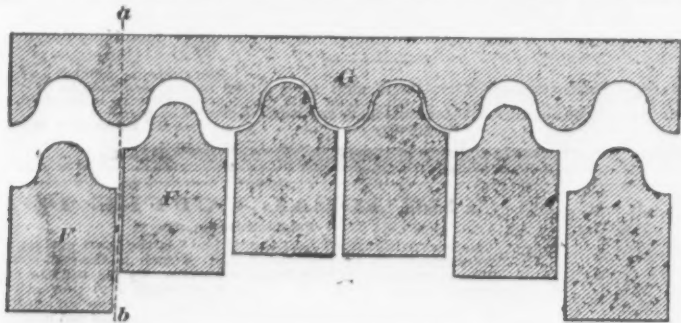
The proceedings in this case have been conducted in a most high-handed manner, unprecedented in the history of equity practice, and it may here be said, and will be appreciated by those familiar with the mode of procedure in patent or equity causes, that the judge knows only that which is put



Cornice Machine Litigation.—Fig. 2.—U. S. Patent of Richard Wheatly and J. Beaumont, Nov. 4, 1867.

before him on paper; he does not see the witnesses, he cannot know who they are, and many points and just impressions are lost to him in consequence. For instance, a witness, from his manner, may be seen to be lying or prevaricating; he may be a man whose face and bearing are a true index to his inner soul, and that a bad one, but his name is John Smith, and John Smith is as good a man on paper as John Brown. Judges, from practice and experience, are good readers of the human mind from exterior and personal actions and bearings, and a judge whose mind is so engrossed with the burden of multitudinous cases should have every facility for obtaining a correct knowledge of not only the testimony of witnesses, but their manner and bearing while delivering the same.

Before entering upon a *resumé* of this extraordinary case, let me again impress upon the minds of your readers the fact that the machine takes no part of the contention. The machine of the Fischer patent is totally different from any of those of the defendant, and there is no evidence on the part of Fischer in the proceedings upon which the decrees of the court have been obtained, that any person had infringed any other claims than those referred to, being the second and fourth, and these are the claims that are held good and valid, no matter



Cornice Machine Litigation.—Fig. 3.—The Dies as Used in the Machines built by Morton, Poole & Co., in 1851.

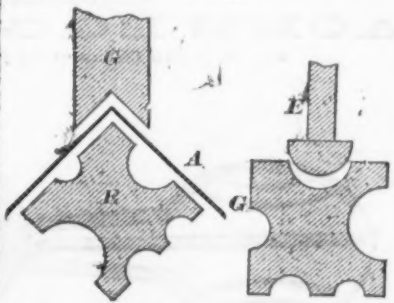
what may be the form or construction or mode of operation of any machine, whether it has a reciprocating carriage, or drop, or lever motion, or any organization of any kind whatever. The specification as to these two claims reads: "The standard of the male die is made concave on one side, to allow the forming of three sides of a square by the apparatus. The male, or stationary die, is underneath the female, or moveable die, for the purpose of preventing the latter from being clogged or made imperfect by dirt or other foreign matter;" and the claims read: "Second, The standard, D, when provided with one concave side as shown,"

"Fourth, Arranging the female die G above the male die E or F, for the purpose of keeping the female die clear, as set forth." Notwithstanding the above facts, Fischer now seeks, by virtue of his decree, to control and recover damages upon all machines, as well as the devices in such machines, as claimed by him, notwithstanding the alleged use is for a purpose entirely different from that contemplated by Mr. Fischer, so far as I am concerned. That is to say, for instance, a patentee of a hand to a clock, without any other claim on clocks, upon a decree sustaining his patent hand, seeks to recover damages, not upon the hand alone, but upon the entire clock—that is, upon all clocks made and sold having this patent hand in use thereon.

The machine, as used by myself and other defendants, performs many other offices besides making a simple angular bend, with a female die over a male die, and since the preliminary injunctions have been issued that device is entirely cast aside, the dies being reversed, and nobody feels any disadvantage, and further controversy, regardless of the injunction, is thus set aside, and the continuous use of the machine exists the same as it ever did.

## THE BLACKSMITH'S SWAGE.

The foundation of the alleged great improvement of Mr. Fischer lies first in the old and well-known blacksmith's swage, in which for ages it has been customary to use the "male above female," or "female above male," according to the exigencies of the occasion. The arranging of these devices in a machine in such a manner that the "female" is above the "male" is the exact subject of the fourth claim of the patent in



Cornice Machine Litigation.—Figs. 4 and 5.—Dies of the English Machine, 1850-1867.

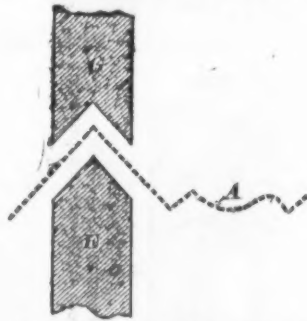
dispute, and the curves at the end of the anvil over which the swages are placed, constitute the subject matter of the second claim. These two devices I now connect with organized machinery in pursuing the state of the art, as follows:

Fig. 1 shows one of the many forms of using the swage, and is used "female above male" and "male above female," according to the requirements of the mechanic. In endeavoring to find hollipers which had a record of 1866, or two years prior to the "invention of Mr. Fischer," I ran risks of my life. I went one day into the workshop of a musical-instrument manufacturer, and there caught this man in the very act of getting his living by using this device. I hailed him. "Stop," says I. "Knowest thou not that thou art doing wrong! Thou art infringing a patent." With uplifted hand, in which was a hammer, he was about to strike me to the earth, exclaiming: "Patent be d—d!" After some persuasion, and with difficulty, I appeased him by saying that I was not the fortunate inventor and owner thereof, but that, like him, I was a culprit. This device, together with the various forms in which this tool or machine is used, was spoken of by our expert, Mr. Renwick, who says: "An example is spoken of and may be seen in pages 186 and 187 of 'The Practical Metal Worker's Assistant,' by Oliver Byrne, published in 1851. (This book was put in evidence.) This description was originally published in Holtzpfell, and I knew it as early as 1843, and in such machines a mere change of location of the dies would bring the male die below the female." Every mechanic knows that they never confine themselves to any location—they merely suited their convenience.

## OTHER ANTICIPATIONS.

Fig. 2 represents the device that was not discovered during the taking of the proofs, consequently it was not put in evidence. It would not, however, have availed as a defense, notwithstanding "the male or stationary die is underneath the female or moveable die, for the purpose of preventing the latter from being clogged or made imperfect by dirt or other foreign matter," as this feature occurs as shown in Fig. 9 of this article, and which was disposed of by his honor, Judge Blatchford in *Fischer vs. Wilson et al*, the

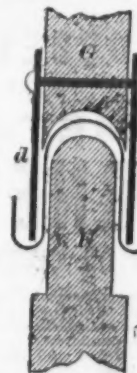
being thrust upward by cams placed underneath and upon a shaft, the center two coming up first, and the four outer ones separately; these dies are placed one-eighth of an inch apart, in order that in corrugating black iron the scale may pass between the two dies and fall to the floor. This explains why the gutters were used under the dies and over the shaft, namely, to ward off and



Cornice Machine Litigation.—Fig. 6.—The Dies Used by William E. Worthen, 1859.

prevent clogging the shaft. This was all proven in the present suits, together with the identity of the machine, with its history; that is, the one now in possession of the McCullough Iron Company, of Philadelphia. Our expert, Mr. H. B. Renwick, testifies that "it is a number of Fischer machines laid side by side," and fully anticipates the fourth claim of the Fischer patent. There was no contradiction of this by Fischer; in fact, Fischer did not even put in any expert proofs whatever. During a conversation with the maker of this machine I impressed him with the fact that the sustaining of the Fischer patent, though dated 1868, would make him an infringer should he take his machine, though built in 1851, and reduce it to one-sixth, as shown by the dotted lines a to b (Fig. 3). He fully realized this fact, and expressed himself as disgusted with such a state of things. I learned, also, that in 1851 a model and a drawing was made of this machine for the purpose of making an application for a patent, which application was abandoned, deeming it then, in face of the state of the art, as unpatentable. This fact appears in the records of this suit, in the form of an affidavit used in a motion which was made by me to dissolve the injunction.

Figs. 4 and 5 illustrate the dies of the English machine used in England to my knowledge since 1850, and are the dies arranged and used in the machine imported into New York from London in 1867, and which arrangement of dies was the subject of the suit, "*Fischer vs. Wilson et al*," which resulted in a decree sustaining the second and fourth claims of the Fischer patent. The fact of the using of these dies did not avail as a defense, as it had not been in public use in the United States two years or more prior to the patent of Fischer, which constitutes a legal anticipation. The upper die of Fig. 4 is the ordinary female die as claimed



Cornice Machine Litigation.—Fig. 7.—The Dies in Shutter Machine of W. E. Worthen, 1859-1862.

by Fischer, while the lower die is the angle, or one of four male dies on same block, which are held in position by counter-fitting blocks, while the hollows, or female dies, are found on the sides, and are used as shown in Fig. 5. Your readers will recognize in this the swage block of their forefathers.

Referring to Fig. 4, I distinctly remember that in my school days I was engaged in making a rabbit's house (rabbits being one of my hobbies). As I was an unskilled mechanic, and did not make my house as snug as I would wish, I took some strips of zinc, and with this very device I bent up angle pieces, which I used for nailing over the corners of my house. Little could I at that time have realized as a possibility that when engaged in the actual battle of life, the very act I then did, after a lapse of some 30 years, would be the subject of such a strife, in defense of which I should be called upon to expend thousands of dollars, years of valuable time, and under the color, and by the erroneous acts of our courts of justice, stand under the stigma as a criminal with a sentence of fine or imprisonment hanging over my head. And this in a progressive nation, one claiming to be second to none in its enterprise and industries. Shame! oh, shame!

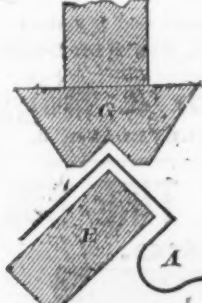
Fig. 6 illustrates the dies as designed by, and publicly used under the direction of, William E. Worthen, the celebrated Civil and Mechanical Engineer, at the Althaus Iron Works, in New York city. This arrangement of dies identically performs the same function as does the Fischer, Mr. Worthen testifies that "I have placed the female die above the male die, and have so used the machine for the purpose of making cornices long anterior to the date of this patent," \* \* \* certainly eight years. \* \* \* Sometimes the female die was above, and sometimes the male die, according to the requirements of the work and convenience. \* \* \* The dies were all slip dies, and could be used by single couples or by gangs. \* \* \* The surfaces of the dies were varied in form—sometimes angular and sometimes curved.

THE ART IN 1859.  
Fig. 7 illustrates the arrangement of dies in a machine used by Mr. Worthen at the

Althaus Iron Works, in New York, 1859 to 1862. The office of these dies was peculiar, though the identical functions of the fourth claim of the Fischer patent are there. The dies G and F are the Fischer dies pure and simple. A length of band iron, d, was secured to each side of the female die G; the shutter slat A, which had previously been bent, was put upon the lower die F, and by an operation of the machine, the lower portion of the slat was formed upward. This is the machine that for years lay upon the sidewalk in Seventeenth street, between Avenues A and B, exposed there for sale, and sold to some person for old iron within the past two years. It is claimed that more complete anticipations than Figs. 6 and 7 could not possibly exist. Fig. 7 was not used in the proofs for final issue, though it had been used in endeavoring to resist the motions for injunction, the court not giving it favorable consideration.

Fig. 8 illustrates a device in which is also embodied the identical claims of Fischer, to wit, the second and fourth, and is a device in common use in all can factories (Devon's, Bostwick's and others). It is readily seen how moldings, A, can be formed on this machine: the diagonal position of the die E is such as to enable them to curl underneath, and not to be crushed out of form, and also to make four sides of a square, one more than Fischer claims, while the upper aris or angle forms the male die. This patent was put in evidence without avail, and our expert testified it was an anticipation and was not contradicted.

Fig. 9 illustrates another patented device for bending sheet metal, and was considered in the suit of "*Fischer vs. Wilson et al*" by

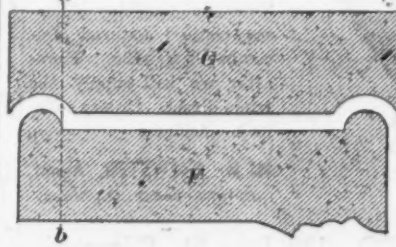


Cornice Machine Litigation.—Fig. 8.—English Patent to Emile Peltier, Aug. 27, 1861.

his honor Judge Blatchford, who held it was not an anticipation. It will be seen that like Fig. 3, should Mr. Beach cut his patented device through at a b, and use it so, he would most assuredly infringe the patent of Fischer.

Fig. 10 illustrates the arrangement of dies in the Seely machine for making clapboard iron. This arrangement of dies has been in use by Seely, and his successors, Noyes & Wines, in New York, since 1862. Frequently upon this machine, prior to 1866, was made several lots of clapboard iron for the firm of Fischer Bros., of which firm Valentine Fischer, the patentee, is an active member, and there is no question of his entire knowledge of this arrangement of dies, and of the construction of the patented machine by which this device is operated. This machine is operated identically with the patented machine of Fischer. The reciprocating carriage is made to lift up and down by "a series of toggles" in precisely the same manner as claimed by Fischer in the seventh claim of his patent. It will be seen that like Figs. 3 and 12, should the dies be cut through at a b, the use of either portion would be an infringement of the Fischer patent.

Fig. 11 illustrates the dies of a machine



Cornice Machine Litigation.—Fig. 9.—U. S. Patent of W. H. Beach, Feb. 5, 1861.

for corrugating sheet metal, and is in combination with other devices for the same purpose. It will be seen that while it does not fully anticipate the fourth claim of the Fischer patent, inasmuch as the female die is not vertically over the male die, the same result is attained, that of the female die clearing itself of dirt, scale, &c., and here we have the hollow standard of the second claim of the Fischer patent. Mr. Baker's first claim in his patent reads: "First, Corrugating sheet metals, &c., between alternating dies paws (or their equivalent) in such a manner as to form but one bend or angle in the sheet at a time." What a pity Mr. Baker's ingenuity did not enable him to see a little farther and add: "For the purpose of keeping the female die clear, as set forth." He could have enriched himself, as Mr. Fischer has done. The human mind is indeed frail. This patent was not used in the defense of either of the suits, as we did not discover it in time. By a ruse of this patent, changing the wording in a very slight manner, it would in itself annihilate the patent of Fischer. The old-fashioned clamp used so many years ago is



Cornice Machine Litigation.—Fig. 10.—The Dies of the Seely Machine, Patented in the U. S. Sept. 9, 1862, and Feb. 3, 1863.

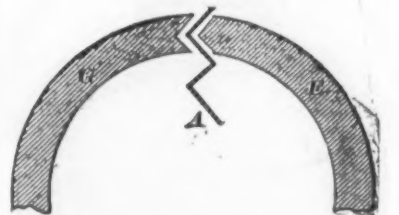
lents) in such a manner as to form but one bend or angle in the sheet at a time." What a pity Mr. Baker's ingenuity did not enable him to see a little farther and add: "For the purpose of keeping the female die clear, as set forth." He could have enriched himself, as Mr. Fischer has done. The human mind is indeed frail. This patent was not used in the defense of either of the suits, as we did not discover it in time. By a ruse of this patent, changing the wording in a very slight manner, it would in itself annihilate the patent of Fischer. The old-fashioned clamp used so many years ago is

also provided with hollow jaws, in order that moldings should not be crushed out of form while additional bands are being made.

Last, not least, comes the wonderful invention of Valentine Fischer, Fig. 12\*, the straw that broke the camel's back. Of this device, I shall only ask, Where is the invention?

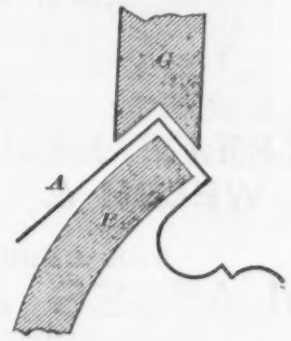
"CONTEMPT."

A few words for the information of the inquirers as to the contempt branch of this



Cornice Machine Litigation.—Fig. 11.—U. S. Patent to J. G. Baker, Dec. 6th, 1863.

case. The inference drawn from the use of the word "contempt" naturally is, that I have been guilty of some infraction of the law or order of the court. This is nothing of the kind, for His Honor Judge Blatchford, on one of the motions before him to punish me for contempt, declared me "not guilty" of a contempt, but designated it a "technical contempt," and ordered me to pay the cost of the proceeding, viz., \$1389.99 (now with interest added thereto). (I maintain that it was a proceeding most heinous in its character, and was a persecution and not a prosecution, as a pamphlet about to be published by me will clearly set forth.) His Honor Judge Blatchford wrote an opinion in the case of "*Fischer vs. Wilson et al*," susceptible of two interpretations, one of which I took (and, on the said motion to punish, His Honor remarked that had he had control of the interpretation I put upon it, he would have worded it differently). This opinion was studied by myself, then submitted to my expert, my counsel, and many of my mechanical friends, who all coincided with my views, and also at a subsequent time, when in court in company with my then counsel, His Honor Judge Blatchford taking in hand a model which belonged to me, stated that "the shoulders on said model may as well be a yard away as where they were, but if the shoulders or concavities were within the working faces of the dies it would be a different matter." Now, I have done everything a loyal and true citizen could have done, on the service of the in-



Cornice Machine Litigation.—Fig. 12.—U. S. Patent of Valentine Fischer, Feb. 4, 1868.

junction order upon me and in presence of the marshal serving it. I called my foreman into my office and ordered him to then and there desist from using the machine or dies, and my works were stopped from Friday to the following Tuesday, during which time the dies were altered, as I took it, to conform to the remarks of the judge and his published opinion. Then Fischer desiring to follow me up, got one William Conolly to visit my neighborhood and peek through my windows, and make an affidavit that I was still using my machine and infringing the Fischer patent. Of this he could not swear satisfactorily to the judge, so an order was procured empowering Fischer, with his expert and counsel, to proceed to my place of business, and with a marshal and posse for the purpose of using force, if necessary, to enter my premises and compel me to operate any or all my machinery for their benefit, and also to compel me to testify against myself, in direct violation of the Constitution of the United States, so that Fischer could get a cause upon which to prosecute me. The posse, however, was not necessary, for the examination did take place, and while I was hundreds of miles away. On my return home I was compelled to testify, and did, but my crime, for which I stand in jeopardy of my liberty, is not that of contempt, but of infringing an alleged patent. The entire history of this remarkable case will be published in connection with future proceedings in another court of justice, where this matter must be more fully and finally adjudicated upon, and the real law breakers punished. I am,

Respectfully yours,  
GEO. HAYES.

New York, March 7, 1881.

P. S.—Since the above was written, I have been informed of still other anticipations of the Fischer patent, which I shall take pleasure in presenting to the readers of *The Metal Worker* at an early day, and which will still further strengthen my position, and show the injustice of the patent I am contesting.

G. H.

Mr. Edison says he has left the laboratory and is now a business man, devoting all his energies to the introduction of the electric light. He has leased the Morgan Iron Works from Mr. John Roach, for the manufacture of service pipes through which to conduct his wires, and he hopes to diffuse light through all our benighted cities at no distant day. New York still withholds permission to use the streets.

\* The male die F, as spoken of in the Fischer patent, means a die with a round top instead of an angular, and is that shown by Fig. 7.



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Isabella Furnace Co., Pa.  
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Spearman Iron Co., Pa.  
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Milton Coal and Iron Co., Ohio.  
Winona Furnace Co., Ohio.  
Moss & Marshall, Ohio.  
H. Campbell & Sons, Ohio.  
Hooking Valley Iron Co., Ohio.  
Cleveland Rolling Mill Co., Ohio.  
Meier Iron Co., Ill.  
North Chicago Steel Co., Ill.  
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FEED WATER HEATER & PURIFIER.



Heating and Puri-  
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Patented July 12, 1877.  
Has Straight  
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SIMPLICITY,  
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Every machine unconditionally warranted. It has an  
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Manufactured in four sizes, for hand use.  
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Manufacturers of  
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Represented in New York by Lamson & Good-  
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SMYTHE'S PATENT  
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Admitted by those who have used them to be the best thing  
made for fastening wire fences, being infinitely superior to  
the ordinary staple, and is of the same weight. Drives  
into Hard Wood as well as into Cedar posts without  
crippling. Farmers give them a try! Railroads use your  
old ties for posts! We make a nail long enough to go  
into the Round Wood. Ask your nearest dealer for them,  
or address the sole manufacturers,  
**WAREHAM NAIL CO.,** So. Wareham, Mass.  
Edgar Robinson, Prop.

**COVERT'S**

Patent Improvement in

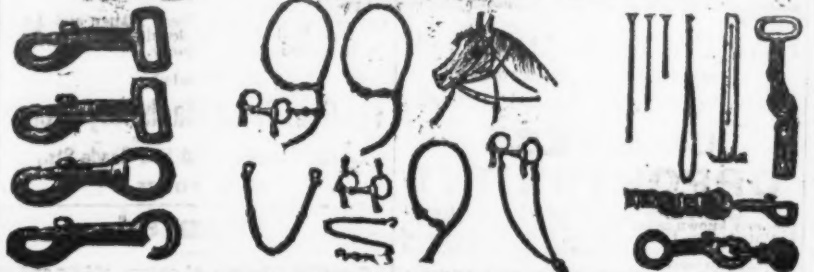
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No more Splicing or Winding  
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Rope Halters, Horse Ties, Cattle Ties, Halter Leads, &c., made by clamping the lap with steel  
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This is all accomplished by machinery, and a superior article can be made at so much less cost, it  
will not pay any one to make up goods the old way. We are now prepared to furnish the trade the  
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real merit become standard, and never fail to give entire satisfaction. They are sold by all leading job-  
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With which the Sashes work as  
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Office of **NELSON LYON,**  
SOLE MANUFACTURER OF  
**Lyon's Patent Metallic  
Heel Stiffeners,**  
Also, Manufacturer of  
**BRUSHES**  
Of Every Description,  
Nos. 17 & 19 Green St.,  
Albany, N. Y., Dec. 8, 1880.

To All Whom it May Concern:

To-day a decree in my suit against G. T. Fisher & Co., of Detroit, for an  
infringement of my patent, was made and entered, of which the following is an extract:  
At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit,  
Michigan, on Wednesday, the 8th day of December, 1880. Present, Hon. H. B. Snows, District Judge.

**NELSON LYON**  
against  
**GUYON T. FISHER, et al.**  
It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jer-  
emiah B. James," passed by Congress and approved April 1, 1880, &c., is a good, valid and constitutional act.  
That the original patent, bearing date July 9, 1879, and numbered 133,433, granted and issued to Joseph  
Baranoux, Jeremiah B. James and Nelson Lyon, when corrected by the Acting Commissioner of Patents, as  
directed by said act, was a good and valid patent.  
That the said Joseph Baranoux was the original and first inventor of the improvements in metallic stiffen-  
ers for boots and shoe heels mentioned and described in said letters patent.  
That the said Nelson Lyon received said patent, granted to said Nelson Lyon for an improve-  
ment in metallic heel stiffeners for boots and shoes, originally patented as aforesaid, is a good and valid  
patent; that said Lyon is exclusively possessed of said Letters Patent and the invention thereby secured.  
That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patent and upon  
the exclusive rights of said Lyon under the same.  
That said Lyon receive of said defendants all the profits, &c., they have made, and in addition thereto all  
the damage he has suffered by reason of the infringement by the defendants, and also the costs, charges and  
disbursements in the action.  
It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defend-  
ants, according to the prayer of the said complainant's bill.  
You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my  
patents must be addressed to and made with my attorney, WILLIAM H. KING, in my care,  
at the above address.

**NELSON LYON.**

**EXCELSIOR LAWN MOWER**



Side Wheel Pattern.

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We make Seven Sizes of Roller Mowers and Six Sizes of Side-Wheel  
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**Perfect Work, Light Draft and Simplicity.**

We have received many first premiums in competitive trials with other Mowers, both  
in this country and abroad. We have special patterns of Mowers for export, meeting  
the requirements of every market. Our new Horse Mower is conceded to be the **Light-  
est and Best** Horse Lawn Mower ever made. N. B.—Horse and Hand Lawn Mowers  
are alike guaranteed in all respects. Send for Illustrated Catalogue. Address

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One Each STOCK, COLLET, DIE and TAP used in

**LITTLE GIANT** Screw Plates.

MADE BY **WELLS BROTHERS & CO.,** Greenfield, Mass.







the Cutlery and Hardware trade, and late president of the Semple & Birge Mfg. Co., of this city, and Mr. Jules F. Valle, recently associated with Messrs. Chouteau, Harrison & Valle, and the Iron Mountain Co., of this city. A new corporation has been formed styled the Semple, Valle & Burchard Cutlery Co. The business has been resumed and the stock is now full and complete. The new company will start with a capital of \$90,000, fully paid up in cash, and, buying goods direct of manufacturers for cash, will be able to compete with any house in their line in this country. Customers of the old house will greatly oblige me by sending in their orders as heretofore. For the present the catalogue of the old company may be used with safety. All orders will be filled at the lowest market price, and will have full benefit of all reductions. Catalogue sent on application. Yours, very respectfully,

M. N. BURCHARD,  
Late Vice-President of the Cleever and Burchard Cutlery Co.  
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We having resumed the manufacture of Nails, after a temporary suspension in that department of our business, take this opportunity of calling your attention to the product of our Nail factory. In the past our Nails have stood in the front rank as to quality and finish, and it is our intention to maintain that position. We are prepared to make Nails that will command the trade of

All the Horse Mowers except the 25-inch cut, are furnished with seat, shafts and new side draft. This company has paid special attention to the demands of the foreign trade, and are prepared to furnish mowers adapted to the requirements of any country where lawn mowers are used. Sargent & Co. carry a full line of these goods at their

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rise in the value of this metal, that as the stock is now very much about the same as it was a year ago, whereas the price now is about £10 per ton below what it was then, on this account speculative buying will be encouraged, and thus somewhat better rates be realized." Manufactures remain as under: Bottoms, 29¢; Braziers, according



to size, 28¢ @ 34¢; Circles, 31¢ @ 34¢; Segment Sheets, 31¢; Fire-box Sheets, 28¢; Sheathing, 26¢, and Bolt Copper, 28¢.

**Tin.**—Our market has not changed materially, but prices are firm and there is evidently a confident spirit prevailing. The jobbing demand has assumed very satisfactory proportions this week. We quote large lines Straits, 19 1/2¢ @ 20¢; Australian, 19 1/2¢ @ 20¢; and English Common, 19 1/2¢ @ 20¢. London cables Straits strong at 288. 10¢, to arrive, and Singapore, 27.50. Shipments from the Straits from March 1 to March 15 have been: To the United States, 200 tons, and to England 250 tons, both very moderate quantities. "London, March 5, 1881.—There is no new feature likely to bear any important influence upon the future of the market to record, except to draw attention to the improved statistics as published on the 28th ult., and which seem to warrant a rise rather than a fall in prices, the total visible stock having been reduced to 14,705 tons, against 15,208 tons on January 31. The deliveries last month were very favorable, amounting to 1936 tons, against 1607 tons in January, and 1778 tons in February, 1880. Shipments last month were light, being from the Straits only 225 tons, and from Australia 600 tons. Another satisfactory point is the reduced stock of Tin in American ports, including that afloat, there being on February 28 last only 3710 tons, against 4360 on January 31, and 8540 tons on February 28, 1880." **Tin Plates.**—The jobbing demand continues good for the season. In a wholesale way there are not as many plates offering as there were a week ago; meanwhile a moderate business is doing in large lines. The market in England is reported stronger. We quote at the close, large lots, ordinary brands, per box: Charcoal, Bright, \$5.80 @ \$6.25; ditto Terne, \$5.25 @ \$5.37 1/2; Coke Tin, \$4.90 @ \$5; and ditto Terne, \$4.87 1/2.

**Lead.**—During the week Lead was dull at \$4.80 for Common Domestic, 300 tons having been sold at that figure on Saturday. Today some small sales were made at 4 1/2¢, and a large parcel available at that price remains unsold. Larger buyers are said to be stocked, so that lots coming in are thrown on to smaller purchasers. On the other hand, there appears to be in other quarters a hopeful feeling for the future, based chiefly upon the expectation of a good spring trade, for which the general prospects in other leading trades furnish an indication. Refined is also quiet at \$4.95 @ \$5.12 1/2, without anything transpiring. "London, March 5, 1881.—This market continues unimproved, the demand being of a particularly quiet character, and prices, although showing no material alteration, are nevertheless somewhat easier, the amount of business doing, whether for consumption or shipment, being confined within narrow limits." Manufacturers are quoted as follows: Sheet Lead, 7¢; Lead Pipe, 6 1/2¢; Tin-lined ditto, 15¢, and Block Tin, 40¢.

**Spelter and Zinc.**—The dull state of affairs in Spelter has remained uninterrupted during the week. We quote Common Domestic, nominally, 5 1/2¢ @ 5 1/4¢, and Sheet Zinc, 7¢. "London, March 5, 1881. This market keeps void of animation, but prices are fairly upheld. In English hard for shipment to India very few transactions are reported, and prices appear quite nominal."

**Antimony.**—Nothing of interest has occurred in this Metal; Cookson commands 15¢, and Hallett's, 14 1/2¢.

## IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending March 16, 1881:

Hardware.	
Brachet & A de	Old rails, pcs., 954
Tools, trunk, 1	Old rails, 2090
Douglas C. H. & Co.	Specular, kilos., 18,740
Pigs, 3	Rails, pcs., 42
Fairbanks & Co.	Scrap, tons, 506
Pigs, 1	
Carr & Hobson	
Plovers, cs., 1	
Graef Cutlery Co.	
Cases, 7	
Grace W. H. & Co.	
Tools, bxs., 2	
Hartley & Graham	
Misc., pkgs., 10	
Hugo, Friedrichs	
Ironware, cs., 13	
Field A. & Co.	
Chains, csks., 16	
Marks & Co.	
Bells, bxs., 2	
Moore W. T. & Co.	
Cases, 12	
Mount J. T.	
Grants	
Merchaute Dispatch Co.	
Cases, 4	
Pim, Forwood & Co.	
Cast propeller, 1	
Rogers Henry A.	
Misc., pkgs., 427	
Remington E. & Sons	
Gun barrels, 183, 93	
Schroverling, Duly & Gales	
Pigs, 13	
Cases, 21	
Wiebusch & Hilger	
Hdw. Co.	
Pigs, 17	
Order	
Bundies, 154	
Iron.	
Adams J. H. & Co.	
Mach'y, cs., 1	
Barbour Bros.	
Mach'y, cs., 10	
Bates & Despard	
Old scrap, 108	
Crocker Bros.	
Pig, tons, 900	
Bes, pigs, tons, 500	
Duryea & Sons	
Pig, tons, 200	
Drexel, Morgan & Co.	
Ore, tons, 1312 1/2	
Gieseheimer & Co.	
Spiegel, tons, 224 1/2	
Irwin Richard & Co.	
Pig, tons, 400	
Lee James & Co.	
Pig, tons, 200	
Mason John W.	
Wire rope, coils, 10	
Nevada Bank	
Pig, tons, 100	
Old flange rails, pcs., 2571	
Old double headed, 1711	
Williamson Jas. & Son	
Pig, tons, 300	
Wilson J. W.	
Mach'y, case, 1	
Metals.	
Spiegel, lot, 3	
Pig, tons, 3390	
Bundies, 137	
Sheets, 151	

## EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending March 15, 1881:

Dutch West Indies.	
Quan.	Val.
Clocks, cs., 4	\$85
Mf. iron, pkgs. 15	114
Nails, bxs., 10	301
Putm, gals., 4638	585
Saw, ma., cs., 1	85
Pistols, cs., 1	85
Hamburg.	
Tinware, cs., 2	74
Saw, ma., cs., 2	50
Hdw., cs., 140	2,607
Mf. wire, cs., 2	40
Mach'y, cs., 6	2,000
I. R. goods, cs., 6	553
Rotterdam.	
Hdw., cs., 7	153
Ag imp, pkgs. 2	130
Clocks, bxs., 2	44
Mf. iron, pkgs. 6	214
Mach'y, cs., 14	710
Amsterdam.	
Putm, gals., 925, 193	87,468
Antwerp.	
Saw, ma., cs., 201	2,400
Ag imp, pkgs. 106	740
Putm, gals., 77,708	65,110
Tacks, cs., 60	2,139
Mf. iron, pkgs. 54	1,399
Ore, tons, 100	750
Hdw., cs., 60	1,853
Gun barrels, cs. 155	2,000
Arms, case, 1	75
Stettin.	
Putm, gals., 406,57	37,571
Danzig.	
Putm, gals., 185,162	17,100
Elseneur.	
Putm, gals., 13,034	13,023
Dutch East Indies.	
Putm, gals., 946,500	32,010
Bremen.	
Putm, gals., 269,299	107,184
Ag imp, pkgs. 305	4,300
Mf. iron, pkgs. 1	500
Hdw., cs., 5	382
Clocks, bxs., 18	109
Mf. iron, pkgs. 6	250
Liverpool.	
Clocks, pkgs., 52	2,727
Spring, cs., 6	140
Mach'y, pkgs., 286	14,069
Ag imp, pkgs. 60	1,000
Ore, cs., 2	70
Saw, ma., cs., 730	10,924
Hdw., pkgs., 111	3,495
Mf. iron, pkgs. 58	900
I. R. goods, cs., 2	400
London.	
Hdw., cs., 308	10,519
Mf. iron, pkgs. 107	3,337
Cutlery, cs., 2	145
Clocks, bxs., 204	4,995
Ag imp, pkgs. 584	2,475
Mach'y, cs., 8	2,205
Saw, ma., cs., 724	10,585
Arms, case, 1	84
Nails, pkgs., 262	931
Bristol.	
Ag imp, pkgs. 35	500
Clocks, bxs., 48	591
Putm, gals., 144,211	14,410
Hull.	
Ag imp, pkgs. 1574	35,393
Mf. iron, pkgs. 48	581
Pumps, cs., 11	400
British Guiana.	
Putm, gals., 15,000	1,819
Glasgow.	
Ag imp, pkgs. 2	95
Saw, ma., cs., 21	1,600
Mach'y, cs., 81	2,704
Hdw., cs., 3	200
Ferro plate, cs. 6	675
British North American Colonies.	
Putm, gals., 4082	715
Copper, csks. 8	1,300
Torpedoes, cs. 3	80
Powder, lbs., 5600	625
Marseilles.	
Ag imp, pkgs. 161	9,300
Salonica.	
Putm, gals., 145,000	17,000
British West Indies.	
Hdw., cs., 23	253
Mf. iron, pkgs. 21	189
Nails, kgs., 70	253
Tinware, cs., 2	41
Saw, ma., cs., 27,996	3,005
Saw, ma., cs., 1	49
Pumps, pkgs., 3	117
Carriages, cs., 8	49
Canada.	
Tin, bxs., 15	23
Copper, csks. 3	10,119
Steels, case, 1	111

## COAL.

The Coal market for the past week is essentially unchanged. Prices have a tendency to drop under the influence of free shipments from the mines and the disposition of buyers to hold aloof in hopes of a decline. There is expectation of a better movement now that freights have come down to moderate rates and navigation is opening to all points. At the Pennsylvania office it is announced that they will remove to Newburgh about the first of the week, and make prices for the season. This is merely a change from Weehawken, the winter point for shipments. The Morris Canal will open in a few days, and the Delaware and Hudson early in April. Anthracite continues dull, and as there are more "outside" Coals offered—i. e., from individual operators, there is a tendency to drop. According to several in the trade, the tone of the market is hardly sustained; all are waiting. One of the large shippers is confident of at least a partial suspension of production, in consequence of the free shipments to the seaboard and the slack demand for consumption, as before noted. There will be a larger market as soon as buyers are satisfied as to the opening rates. In Bituminous Coals there is no falling off in prices, and the demand is steady. Altogether, the prospect is hopeful. The canal opens from Cumberland to Youngstown in April, when the tonnage will be considerably enlarged. The New York price of Cumberland is \$5.20; at Baltimore, \$3.75. Freights by sailing vessels to Long Island Sound and points east of the Cape have declined to about a fair opening price—60 cents to New Haven; 90 cents to Providence; for schooners and barges, 85 cents; from New York to Boston, \$1.15 @ \$1.25. It is denied, both by the Pennsylvania Coal Company and the Delaware and Hudson Canal Co.'s office, that there has been any combination to force up prices or to restrict production.

## OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	\$ 10 @ \$ 17
Copper Bottoms.....	" 11 @ 14 1/2
Yellow Metal.....	" 10 @ 10 1/2
Brass, heavy.....	" 11 @ 12
Brass, light.....	" 10 @ 10 1/2
Composition, heavy.....	" 13 1/2 @ 14 1/2
Tea Lead.....	" 10 1/2 @ 11
Zinc.....	" 10 1/2 @ 11
Pewter, No. 1.....	" 14 @ 14 1/2
Pewter, No. 2.....	" 13 @ 13 1/2
Wrought Iron.....	" 24 @ 25
Light do.....	" 21 @ 22
Store Plate.....	" 13 @ 14
Machinery do.....	" 16 @ 17
Grate Bars.....	" 8 @ 9

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	\$ 1 1/2 @ 4 c.
White Cotton, New.....	" 2 1/2 @ 3 c.
White, No. 1.....	" 4 1/2 @ 4 1/2 c.
White, No. 2.....	" 2 1/2 @ 2 1/2 c.
Soft Wood.....	" 10 c @ 11 c.
Mixed Rags.....	" 2 c @ 2 1/2 c.
Gunny Bagging.....	" 1 1/2 @ 1 1/2 c.
Gunny Butts.....	" 3 c @ 3 1/2 c.
Book Binding.....	" 2 1/2 @ 2 1/2 c.
Book Stock.....	" 1 1/2 @ 1 1/2 c.
Newspapers.....	" 1 1/2 @ 1 1/2 c.
Waste Paper and Scraps.....	" 1 1/2 @ 1 1/2 c.
Kentucky Bale Rope.....	" 10 @ 10 c.

## PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, March 15, 1881.

**Pig Iron.**—The market shows scarcely any change of feature, and business has moved quietly along at about the same range of prices as quoted a week ago. Demand and supply is so evenly balanced that the future of the market is still shrouded in obscurity. The expectation of a larger business, usual at this season, has had no visible effect as yet, and in view of the depressing advices from abroad, it is doubtful if anything in the way of an advance will be attempted at present. There is a very fair amount of business doing, sales, deliveries and production being apparently about on an equality. There is nothing likely to change the position in the immediate future, so far as we can see, as the anticipated increase in consumption will probably be met by increased production or imports from abroad. Producers meet buyers freely on the basis of present prices, and consumers are equally satisfied when they can secure the brands they have been accustomed to use. With new brands the case is somewhat different, and inducements in price or in other shapes are necessary in order to keep stocks moving. The position is a conservative one, and generally pretty well understood by the trade at large. An enormous production is recognized, an equally large consumption realized, without any fears that supplies of raw material will be found insufficient. The speculative element is, therefore, completely eliminated, so that there is no inducement for a production in excess of current requirements. Advices from abroad indicate that the Scotch market is in a much less favorable condition than our own. Large quantities of Iron are being placed in store, for which warrants are issued and sold on the open market to speculators. This course may keep the furnaces in blast for a time, but it is evidently discounting the future at a ruinous rate, as these same warrants are pretty sure to come on the market when least wanted, and when most desirable that they should be kept away. Fortunately for American ironmasters, our markets have steadily refused to "boom," and if foreign Iron has to come here at all it will have to be at low prices. For Foundry Irons we quote prices steady at \$25 @ \$26.50 for No. 1; \$22 @ \$23 for No. 2, and \$20.50 @ \$22 for Gray Forge. Charcoal Iron is unchanged at \$31 @ \$34 for Warm-blast, and \$35 @ \$38 for Cold-blast, according to character of brand.

**Foreign Pig.**—English has sold at \$18.50 for G. M. L., and there are bids of \$18 for lots of 500 tons and upward. Scotch is weak and very little doing; a few small lots of Eglinton have changed hands at \$21.50 @ \$22; Gartsherrie nominal, at \$24 @ \$25; Bessemer is inactive, and only a few small lots have been placed, it is said, at about \$25. Bids of \$25 for best brands, in large lots, have been made and refused, but at an advance of about 50¢ we have no doubt a large business could be done.

**Muck Bars.**—The demand has improved somewhat, and several lots of 50 to 200 tons each have been taken at \$38.50 at mill. In other cases \$38 has been accepted for 500 ton lots; but holders are firm, and trying for an advance.

**Blooms.**—The market is steady, and prices firm as last quoted, viz.: \$65 1/2 ton of 2464 lbs. for Charcoal; \$55 for Anthracite, and \$47.50 @ \$50 for Scrap Blooms.

**Structural Iron.**—The position is not materially changed from last week, although a large amount of work has been given out which will require shapes of various kinds. Ship-building is specially active; new contracts have been entered during the week, and steady employment to full capacity in all the leading yards is now fully assured for the balance of 1881. Bridge work is also looking up, and the car shops were never more crowded with work than they are today. It must be admitted, however, that the mills are not as fully occupied as might be supposed, and from them complaints of dullness are very general, although, as intimated in our last, this is in part due to the increased capacity for production, which some of the leading manufacturers have recently made, and which they are naturally desirous to see fully employed. Prices are unchanged at 2.6¢ for Angles, 3¢ for Tees, and 3 1/4¢ for Beams and Channels.

**Bar Iron.**—The demand keeps up very fairly, and the mills are employed to near their full capacity. Orders are not specially large, but the demand is so continuous that there is no chance for stocks to accumulate. Prices are steady, and for Refined Iron the card rate of 2.4¢ is strictly maintained. We hear of occasional sales of Iron at about 2.3¢, but quality not guaranteed. Skelp Iron has been sold rather more largely than for some time past, several transactions, including lots of 200 to 500 tons each, having been taken, it is said at about 2.35¢ for grooved, and 2.65¢ @ 2.75¢ for Sheared. The general

outlook as regards the Bar trade is good, and an active demand at about current rates seems to be assured for some time to come.

**Plate and Tank Iron.**—There has been a slightly better demand, but the amount of orders entered have not been important. Inquiries for larger lots have been received within the past day or two, and there is a prospect that business will tone up a little before the end of the month. Bids for lots of 200 to 500 tons each have been solicited for bridge, ship and tank building purposes, and it is likely that manufacturers will be kept fairly full of work during the next month or two. In Boiler Iron too, there has been a good deal of activity, and the market may be quoted steady and firm at about 2.75¢ for Tank Iron; 2.87 1/2¢ for Universal Plates; 3.25¢ for Refined Iron; 4.75¢ for Flange, and 5.75¢ for Fire-Box. Sales to-day of several hundred tons Ship Plate at 2.7¢.

**Sheet Iron.**—The demand is very active, and the mills are employed to their fullest capacity. Some large concerns have orders booked, to complete which will require from three to five months' steady work. Buyers of wholesale lots obtain liberal concessions, but for small parcels the following may be regarded as fair quotations:

Common Sheet, No. 26 to 28.....	4 1/2 c.
Common Sheet, No. 28 to 30.....	4 1/2 c.
Common Sheet, No. 30 to 32.....	4 1/2 c.
Best Refined 1/4" @ 1/2" advance on the above.....	4 1/2 c.
Best Bloom Sheets, No. 26 to 28.....	7 1/2 c.
Best Bloom Sheets, No. 28 to 30.....	7 1/2 c.
Common Red Plates, 3/16 to 1/2.....	3 1/2 c.
Blue Annealed, 3/16 to 1/2.....	3 1/2 c.
Best Bloom Galvanized, discount.....	35 c.
Second quality, discount.....	45 c.

**Steel Rails.**—The market is in a condition which hardly admits of quotations being given, unless of a very general character, and to any but regular customers manufacturers are not naming prices. They have nothing they care to sell, but when they do accept an order it is to oblige their regular trade, or to secure an extra figure from an outsider. Under these circumstances, quotations convey but little idea of the real condition of the market. There is a general disposition, however, to meet the price of foreign rails, and when buyers are not very urgent as regards time of delivery, they can place orders at about \$60 at Eastern mills. We hear of sales, both English and American, being made at \$62.50 @ \$64, which may be regarded as fair rates for spring and summer deliveries. A 10,000 ton sale of English Rails for shipment is reported at \$6. 6/10, f. o. b.

**Steel Blooms.**—We hear of sales at some concessions from last week's rates, a 2000-ton lot having been secured at less than \$6. 10/10, e. i. f. The best English makes are held at \$6 12/16, however, at which several thousands were placed since date of our last report.

**Iron Rails.**—The improvement noted in our last has been maintained, and a larger business and better prices realized. A lot of 1800 tons 56s was placed at \$47, a 1000-ton lot at \$47.50, and small lots at \$48, all net cash, at mill. Light Rails have been in very active demand, and several good-sized lots have been placed at from \$49, at mill, for 35s, to \$52, at mill, for lighter sections. Several other lots are under negotiation, and the mills have a fair prospect for securing a full summer's business within the next 30 days. English Rails have sold at very irregular prices. A 5000-ton lot of 35s, for shipment to New York and for a road in the Northwest, were sold at about \$6. 5/10, e. i. f. Lots in store are held at higher figures, however—say, \$46 asked.

**Railway Supplies.**—Inquiries are numerous, but sales are slow, unless at materially lower rates than are generally asked—say: Spikes, 2.75¢; Bolts and Nuts, 2.25¢ @ 2.75¢; Fish Plates, 2.4¢ @ 2.5¢.

**Steel Ends.**—The market is irregular and uncertain; transactions have been reported at \$29 @ \$30. Buyers offer \$29 to-day, but we doubt if there is any to be had at the moment.

**Old Rails.**—There is very little change in this department, although prices are firm. Sales have been made at about \$27.50 in store for flanges, but there are very few offerings, and anything like a heavy demand would have a tendency to advance prices. A lot of 700 tons doubles sold at \$29.25 on cars, and \$27.75 on cars is bid for flanges to-day. There is nothing in the immediate outlook likely to change the position either way, so far as we can see, \$27.25 @ \$27.75 in store being about the extreme rates.

**Scrap Iron.**—The demand has subsided, and to effect sales lower prices have to be accepted—say \$28 @ \$30 for Wrought and about \$20 for Cast. A few choice lots are held at higher prices, but there is no demand at present at over \$30.

## PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., March 15, 1881.

Manufacturers generally, while admitting that business is better than usual at this season of the year, complain that orders are not coming in as freely as they had been led to expect, but it is owing very largely to the unfavorable weather, which has kept back outdoor work, and then the bad condition of the country roads is also a drawback. The prospect, however, never was better for an active spring trade, and all that is wanted now is a few weeks of good weather. Here in Pittsburgh, notwithstanding taxation is heavy, a great deal of building is contemplated. The architects are all busy getting out plans, and just as soon as the weather will permit, builders will have about all they can do, and while this is true of Pittsburgh, it is, we have no doubt, equally applicable to all cities and towns throughout the West, which leads to the belief that there will be an active demand for all kinds of building material.

**Pig Iron.**—While business is not as active as it was about the first of the year, there is a very fair demand, and all good qualities are held with considerable firmness, though the offerings of the kind in question are light. The unsatisfactory condition of the market for Manufactured Iron is having its legitimate effect upon the raw article, the latter being higher proportionately than the former, and consumers are inclined to use up what they have on hand in preference to

anticipating future wants. They are inclined to hold off, claiming that sooner or later there must be a radical change in the situation—an advance in the value of the products or a decline in the raw article. Furnacemen give no evidence of weakness. While admitting that the market for Finished Iron is unsatisfactory, they claim that the only relief is for the makers thereof to put up prices. They contend that as there is no chance to reduce the cost of production, and current rates afford a small margin for profit, no decline in the price of Pig Iron can reasonably be expected.

Moreover, it is alleged that, in view of the active demand for Bessemer Iron, which will employ a large proportion of the producing capacity of the country all this year, the production of Ordinary Mill and Foundry will be comparatively light in consequence. Forge Irons remain about as last quoted: Cold-short, \$21.50 @ \$22, 4 mos.; Ordinary Neutral, \$22.50 @ \$23, 4 mos.; strong do., \$23.50 @ \$24; Cinder Mixture Red-short, \$25 @ \$25.50; all-ore do., \$27 @ \$27.50; Bessemer, \$28 @ \$29; Foundry, \$23.50 @ \$25 for Nos. 2 and 1. Sales of 2200 tons all Lake ore Red-short, \$27 @ \$27.50, 4 mos.

**Manufactured Iron.**—The market continues in a most unsatisfactory condition, as regards the maker, but it is thought that an improvement, both in demand and price, is near at hand. With better weather it is confidently expected that orders will come forward more freely, and with a demand sufficient to employ all the capacity there will not be much difficulty in obtaining better prices. It is not true, as reported by some of the papers, that the mills are all running in full blast;



ing to brand), \$27 @ \$29; Anthracite, \$24 @ \$26; Coke, \$25 @ \$27; Silvery (soft), \$24 @ \$26.

**Rails.**—While the demand for Steel Rails continues active, it is impossible to place orders for anything like early delivery, as the mills are sold up for almost the entire year, so that \$63 @ \$64 for present delivery are merely nominal quotations. The demand for Iron Rails continues active. We quote according to specification, \$51 @ \$55.

**Manufactured Iron.**—We have no special features to note in this class of Iron; the demand is good and market remains firm. We quote: Bar Iron, \$2.50 for ordinary orders, and \$2.40 for car-load lots; Sheet Iron, from 10 to 14 gauge, at \$3.40, and \$3.30 for large lots; Tank Iron at \$3.40, and \$3.30 for large quantities; Hoop Iron, \$3.20 @ \$3.30.

**Nails.**—The market for Nails continues firm under the recent advance in the card rate, with a good demand. We quote \$3.20 for ordinary lots, with usual discount of 10¢ off for car-load lots and 2¢ for cash.

**Steel.**—A fair amount of business is reported as being done in Tool Machinery and Steel for agricultural purposes, and prices remain firm. We quote: Tool, 12¢; Machinery (open hearth), 6¢; Crucible Machinery, 7¢; Hammer (Cast), 2 inches and under, 9¢; over 2 inches, 10¢; Cast Spring, 7¢; open-hearth Spring, Tiro and Sleigh Shoe, 5¢. In large lots these prices would be shaded.

**Scrap Iron.**—The demand for Scrap Iron continues dull and market weak. We quote: Forge Scrap, \$30 @ \$32; No. 1 Wrought, \$26 @ \$27; Heavy Cast, \$24 @ \$25; Stove Plate, \$17 @ \$18.

Messrs. Hale, Cleveland, Bonnell & Co., of Chicago, who have for some years past carried a large stock of manufactured iron, will cease to do so on and after April 1st. Mr. Hale and Mr. Cleveland will locate in their house in Cleveland, and Mr. Bonnell will continue an office business there under his own name for the sale of their Irons. They find that it will be more expedient for them to consolidate their business here with the Cleveland house, as the most of their deliveries, with the exception of their local trade, are made from that point, and consequently they can see no necessity for carrying a large stock of Iron here under the circumstances. It is said that there are other important changes in contemplation, but we are not in a position to define them at present.

#### CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., Chattanooga, March 14, 1881.

The steadiness of the Southern Iron and general markets for manufactured wares and material, since the first of the year, has been phenomenal, and is becoming monotonous to dealers and reporters. There has not been a quotable fluctuation in the price of any leading article, except Nails, for several weeks, and but two or three have perceptibly varied since January 1. The weather this week has been mostly very fine, and the starting of the Vulcan Nail Works, and also the Lookout Bar Mill, have combined with good weather to give quite a fresh impetus to general trade.

**Pig Iron.**—Foundry grades are not so scarce as they were a few weeks ago, though hard enough to get to make prices very firm. Other grades are in good request. The market is in a healthy condition, the demand keeping pace fully with the supply. We quote: No. 1 Foundry, \$25 @ \$27; No. 2 Foundry, \$23 @ \$25; Gray Forge, \$20 @ \$22; White and Mottled, \$18 @ \$20; Car Wheel Metal, \$38 @ \$40.

**Miscellaneous Articles.**—Old Rails are in pretty full supply, the fine weather being favorable for track renewals. They continue fairly steady, with a prospect of an early weakening, at \$26 @ \$28; Wrought Scrap, \$20 @ \$24; Cast, \$15 @ \$17; Old Wheels, \$23 @ \$30.

**Ores.**—We quote: 50% Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25.

**Nails.**—The Nail market is quiet, with a good demand at \$3.25 rates. The market here will remain steady until the Western mills fill up the Northwest, when they will invade the South to dispose of their surplus.

**Manufactured Iron.**—Bar shows little improvement, and continues to be rated among the dull and profitless articles. Track supplies and railroad articles generally are active and strong. We quote Bar at \$2.35, and weak; Railroad Spikes, \$3; Track Bolts, \$4; Wrester Bolts, \$4.50; Fish Plate, \$2.50.

**Coal.**—We quote Lump at \$4 @ \$4.50 per ton, delivered. Run of mine to manufacturers, \$2 @ \$2.50, at mills.

**Coke.**—Furnace Coke, \$3 per ton at furnace; Foundry, 10¢ @ 12¢ per bushel.

**Steel and Iron Rails.**—The demand for Steel Bars is very strong. Large invoices of foreign make will be delivered at New Orleans, Nashville and other Southern points during the spring. The call for Iron Rails has also been heavy for six weeks past and prices are very strong. We quote American Steel at \$62; Foreign, \$60 @ \$61; Iron, \$50 @ \$52; small T, \$57 @ \$60.

**Lead.**—We quote: Pig Lead, 4½¢ @ 5¢.

**Steel.**—We quote: Plow Slabs, 3-inch and under, \$4.70; Black Diamond, ordinary sizes, 13¢.

#### BOSTON.

MARCH 12.—The market for Pig Iron continues dull and unsatisfactory, and consumers are generally disposed to keep their supplies light for the present. Prices are consequently easy, but producers are not inclined to force business, as the cost of production must be reduced before lower prices can be expected. We quote American Pig Iron at \$25 @ \$25.50 for No. 1 X; \$22 @ \$22.50 for No. 2 X, and \$21 @ \$21.50 for Gray Forge. These prices are f. o. b. at the port of shipment. Small spot lots will command \$2 ½ to higher. Foreign Pig continues in moderate demand at unchanged prices. We quote: Langlois, \$24.50 @ \$25; Glengarnock and Gartsherrie, \$23 @ \$24; Eglington and Carnbroe, \$22 @ \$22.50, and Middleboro', \$18.50 @ \$19 for

No. 3 and \$20 for No. 1. Old Rails are quiet, but held with considerable firmness at \$32 for American, and \$28 @ \$29 for foreign. Buyers, however, are disposed to anticipate lower prices. **Manufactured Iron.**—There is fair demand for Refined Bars at \$2.30 ½ to 100 lbs. Norway and Swedish are unchanged at \$3.75 for Bars and \$4.75 for Shapes. Nails are firm but quiet at \$3 ½ for rod, to 60d. Plate Iron has shown scarcely any change during the past four months. We quote: \$2.95 for Common and Tank; \$3.15 @ \$3.25 for C. No. 1; \$3.50 @ \$3.62 ½ for C. H. No. 1 Shell; and \$4.62 ½ @ \$4.75 for C. H. No. 1 Flange, and 6½¢ for Bay State X Flange for fire-boxes, &c. Copper has been a little more active, with sales of Lake at 19½¢ @ 19¾¢, cash, and 19½¢ for April delivery. The market closes firm at these figures for large lines of Lake, and for Baltimore 18½¢ @ 18¾¢. The Boston store price is 19½¢ for Lake and 18½¢ @ 19¢ for Baltimore. There has been no change in the combination prices of Manufactured Copper. We quote: New Sheathing Copper, 26¢; Braziers', 28¢, and Bolts, 28¢; Bottoms, 31¢; American Yellow Sheathing Metal, 17¢ @ 18¢; Yellow Metal Bolts, 20¢; and English Yellow Metal Sheathing, 14¢, in bond. Lead quiet and prices are largely nominal. We quote \$4.85 for car-load lots, delivered in Boston. Store lots command 5¢ @ 5¼¢ for Western and 4½¢ @ 5¢ for remolded. The prices of manufactures are unchanged, as follows: Bar, 6½¢; Pipe, 6½¢; Sheet, 7¢; Tin-lined Pipe, 15¢; Tin Pipe, 40¢ @ 5¼¢ for Western and 4½¢ @ 5¢ for remolded. Spelter is quiet and unchanged, quoting Western at \$5.20 by the car-load, and 5¼¢ @ 5½¢ for smaller lots. Remolded is obtainable at 4½¢ @ 4¾¢. Sheet Zinc is in moderate demand at 7¢ @ 7¼¢. Tin is moderately active and steady, quoting Straits and English at 19½¢ @ 20¢. Tin Plates are dull and in buyers' favor. We quote good-sized lots, ordinary brands, as follows: Charcoal Bright, \$6 @ \$6.25; do Ternes, \$5.25 @ \$5.37½; Coke Tin, \$4.90 @ \$5, and do Ternes, \$4.87½ @ \$5.—Commercial Bulletin.

#### LOUISVILLE.

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 113 and 115 Main street, report to us as follows, under date of March 12: Business fair in all lines, though there is no indication of advancing prices. Bar is notably steady, \$2.25, net, delivered here, is as low as an assorted order for 100 tons or more could be placed to-day, and no cutting is offered by those impetuous mills that are generally willing to shade price. There is no deviation from the Nail card by manufacturers. What cutting is done is on the part of jobbers realizing on previously bought stocks. This is a disturbing influence always to be met, and it is not more manifest now than usual. The screw combination, too, as far as we can learn, is solid. Steel goods lack strength, and Carriage Springs are as low as we ever know them. The high price of Coal here this winter has interfered materially with cheap production, and now the railroad embargo continuing, we are not as happy as we might be. But the boiler yards, machine shops and boat yards are all full of work. The railroads are so crowded the prospect for boatmen is fine. The plow suit of Avery vs. Meikle is progressing in the courts. The season is so backward that there will be a quick demand for agricultural implements when spring does set in.

#### CINCINNATI.

MARCH 14.—Pig Iron.—During the past week the market has been very quiet, but prices are fairly maintained. The supply of all grades is ample—the consumption about equal to the production—a condition that is thought will obtain through the season. Sales during the past week were at about the following quotations:

C. C. Foundry, Nos. 2 and 1.4 mos. \$25.00 @ 27.50  
Coke Foundry, Nos. 2 and 1.4 mos. \$23.00 @ 25.00  
Bit. Foundry, Nos. 2 and 1.4 mos. \$22.50 @ 24.00  
Bit. Silver Gray, No. 1.4 mos. \$22.50 @ 24.00  
Bit. Silver Gray, No. 2.4 mos. \$21.50 @ 23.00  
Bit. Silver Gray, No. 3.4 mos. \$20.50 @ 22.00  
C. C. Cold-blast, Car Wheel, 4 mos. \$35.00 @ 38.00  
C. C. Warm-blast, Car Wheel, 4 mos. \$25.00 @ 27.00  
Bar Iron, card rate..... 2.15 @ 2.25  
Old Rails..... 28.00 @ 30.00  
Car Wheels..... 31.00 @ 32.00  
Wrought Scrap, per 100 lbs..... 1.00 @ 1.10  
Cast Scrap, per 100 lbs..... .60 @ .70

#### NEW ORLEANS.

Messrs. MINNIGERODE & Co., dealers in Railway Supplies, 61 St. Charles street, write as follows, under date of March 10: High freights to New Orleans continue to hinder importations, but we think that more tonnage will offer and bring freights to their normal condition. Sales of 8000 kegs Riverside Nails are reported at \$2.70 f. o. b. works, and some transactions in round lots of No. 1 Wrought Scrap have occurred at private figures.

Scotch Pig, f. o. b., as per brand..... \$27.00 @ \$28.00  
Bar Iron..... .04 @ .05  
Nails..... .04 @ .05  
New Iron Rails (foreign) for standard section..... 45.00 @ 48.00  
New Steel Rails (foreign) for standard section..... 65.00 @ 68.00  
Track Spikes..... .01½ @ .02  
" Bolts..... .01½ @ .02  
" Spikes..... .03 @ .04  
Old Iron Rails, f. o. b., 20 d. 20.00 @ 22.00  
Old Car Wheels, gross long, f. o. b., 20 d. 20.00 @ 22.00  
No. 1 Wrought Scrap, net ton, f. o. b. 26.00 @ 28.00  
No. 1 Cast Scrap, net ton, f. o. b. 21.00 @ 23.00

#### ST. LOUIS.

Messrs. HOFFER, PLUM & Co., Pig Iron and Iron Ore Merchants, 417 Pine street, write us as follows, under date of March 12: The demand has fallen off this week. For cash we quote:

NOT BLAST CHARCOAL.  
Missouri, No. 1..... \$28.00 @ 30.00  
Southern, No. 1..... 26.00 @ 28.00  
Hanging Rock No. 1..... 25.00 @ 27.00

ORE AND COAL.  
Missouri No. 1..... none offering.  
Southern No. 1..... 35.00 @ 36.00  
Ohio No. 1..... 24.00 @ 25.00

MILL IRON.  
Cold-short..... 22.50 @ 23.00  
Red-short..... 25.00 @ 26.00

CAR WHEELS AND MALLEABLE IRON.  
Missouri..... 32.00 @ 35.00  
Southern..... 35.00 @ 38.00  
Ohio..... 30.00 @ 32.00

#### RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of March 15: The sales of Pig Iron in March show a marked improvement on transactions of the two preceding months. The large number of buildings under construction in the Southern States, and the demand for mill productions, indicate a fine business for the spring and early summer. Prices remain firm, without change in last quotations:

Scotch Pig Iron..... \$24.00 @ 27.00  
American Scotch Pig Iron..... 27.00 @ 29.00  
No. 1..... 25.00 @ 28.00  
No. 2..... 22.00 @ 25.00  
No. 3..... 21.00 @ 23.00  
Mottled and White..... 19.00 @ 21.00  
Virginia Charcoal C. B. Wheel Iron..... 38.00 @ 41.00  
Old Rails..... 28.00 @ 30.00  
Old Wheels..... 28.00 @ 30.00  
Wrought Scrap, No. 1..... 22.00 @ 25.00  
Cast Machinery Scrap..... 21.00 @ 23.00  
Richmond Refined Bar Iron..... 2.50  
Horse Shoes, Tredegar..... 4.00  
Mule..... 5.00

#### CLEVELAND.

MARCH 15.—With the exception of a little more inquiry for Ores for the coming season, there is scarcely anything new to report this week, although there is no doubt but that Ore companies are quietly filling up with contracts, and a majority of the amount of Ore to be shipped from Lake Superior is under engagement. Lots for present delivery are gradually being lessened—especially in this case with Ores suitable for making Bessemer metal.

Bessemer Speculars and Magnetics..... \$9.50 @ \$10.50  
Bessemer Hematites..... 7.50 @ 9.50  
Manganese Range Ores..... 8.00 @ 9.50

Speculars and Magnetics..... 8.50 @ 10.50  
Hematites..... 7.00 @ 9.50

### Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., February 28, 1881.

#### THE TRADE OUTLOOK.

has not brightened in any appreciable degree since the date of my last week's report, nor are there any present indications of that renewed activity for which we unfortunate Britishers are still so ardently hoping. I fancy the optimists are "down on their luck" just now, and are disposed to regard matters as being excessively bad for their views. In saying this I am bound to confess that at the beginning of the year I counted myself among the moderate optimists, and was of opinion that we might safely look forward to a good iron trade during the year 1881. At that time the balance of the evidence then obtainable was decidedly in favor of continued improvement, always excepting the reservation as regards the excessive production of pig iron, which has always been a stumbling block in the way of those who were inclined to "go for" increased activity all round and permanent sustaining of prices. That stumbling block not only remains, but has since attained grosser proportions—in deed, it is a veritable and ugly lion in the path, and must either be wholly removed or "whittled down" before we can expect any solid change for the better. This is admitted on all sides, except by those most actively concerned, and they appear willing to continue the present excessive production at all hazards. One day they urge that the "expected renewal of United States orders" warrants the making of all the pig iron their furnaces can turn out, while another day their excuse is "an anticipated general augmentation of wages may make fuel dearer, when of course," &c., and so the make proceeds just as heretofore, and no individual stands between the trade and its ruin. Another solitary furnace has been damped down in Scotland, it is true, but if that step be intended as a remedy, the idea does not strike one as being heroic, save as an imitation of Mrs. Partington's attempt to mop up the Atlantic. In the meantime Scotch warrants and makers' iron are both lower, and there is very little life as regards the demand for either, consequently it does not appear at all clear how the current output of pig is to be made negotiable. The public are tired of accumulating warrants and vainly waiting for that rise which doesn't come along, and many of those who have thus invested are trying to realize their holdings. They find it difficult so to do, and the manufacturers of warrants also experience some trouble in selling, the fact being that the enormous stocks in reserve have caused the members of the iron ring to lose their grip over the market. They no longer have exclusive control over the fluctuations—what ever their opinions on the subject may be—and unless the quantity of paper, or of iron, be reduced within much narrower compass, those who have hitherto had pretty much their own way will most likely find themselves playing second fiddles instead of first violins. Those remarks especially apply to Glasgow. Middlesboro, as I have pointed out on former occasions, is in a rather better position, and is so favorably situated as regards cheapness of manufacture and facilities for export, that Cleveland iron must necessarily command a major share of any business that may be on the move. The dullness of ordinary pigs has apparently affected hematites, which are somewhat weaker, although I learn that they are so more out of sympathy, as it were, with the other crude irons, than for any valid reason touching themselves. As regards ordinary merchant irons there is very little that is new to report. Quietude reigns in all directions. The home market does not show any signs of improvement; indeed, the severe weather of January and the more or less wintry period since have apparently quite "knocked the bottom out" of the activity which was beginning to be experienced. The weather is still sharp, with snow in many parts of the country, a state of things which is materially checking building operations, and so limiting the demand for iron and hardware. It is also bad for the agriculturists, upon whose devoted heads misfor-

tures appear to thicken. I observe it stated that in some portions of the low lands of Lincolnshire, Cambridgeshire, Norfolk, &c., there are farms, or large areas of land, which have not been visible since October last! They were flooded then and have since remained under water. In other cases the floods have been less constant, but scarcely less disastrous. Where the water has not effectually swamped the land, the foot and mouth disease, or the "fluks," have spread havoc among the live stock, so that "taking one consideration with another the farmer's lot is not a happy one." Thousands, tens of thousands, of acres of excellent land are untenanted owing to the dangers which just now surround the pursuit of agriculture and the impoverished condition of the farmers as a body. Some of the larger landowners are cultivating their farms themselves, while others are content to let the occupants off rent free provided they pay the rates and taxes. This deplorable state of things is naturally most serious for all concerned. In some of the best agricultural counties it is difficult to sell farms at all. In Lincolnshire, the other day, nearly 1000 acres of fine black soil, rich land, were offered in sundry lots, and not a single parcel could be sold. For about 320 acres in a ring fence, with buildings, &c., the best offer was £14,000—made by a relative of my own—or less than £44 per acre; whereas the same lot was purchased about eight years ago, after an eager and excited competition, at over £150 per acre! These are startling facts. They reveal an astonishing and absolute diminution in the wealth and resources of the nation which are staggering. The matter is not wholly one of fault, but largely of misfortune. If the English farmer cannot grow and sell wheat in open competition against your growers, he may not unreasonably attribute the result to the operation of free trade; but if his live stock die off from mysterious diseases, it is not clear where his remedy lies or where he has room for complaint. At all events, that is how matters stand, and until there is some change for the better, many of our leading manufacturing industries must necessarily be serious sufferers. I am not sufficiently acquainted with the theories and principles of the Cobden Clubists to know what remedies they propose for the alleviation of the condition of our principal industry (which agriculture is, beyond all question), but I should infer that they would advocate the utter extinction of the British farmer rather than that one single sacred axiom (or "fad") of the fetish should be violated on his behalf. Leaving, however, our actual "muttons" for our metaphorical ones, it may be interesting to note that there has been little or no change of importance in prices during the week. Quotations for leading lines of pigs I give elsewhere. Finished iron is very quiet on the basis of £7. 10/ for marked Staffordshire bars, with sheets, £7 @ £9. 10/; hoops, £8 @ £9, and plates, £7 @ £12. Welsh bars are in offer at £5. 2/6 @ £5. 7/6; common Staffordshire, Shropshire, Worcestershire, Yorkshire or Lancashire at £6 @ £7, and other sorts in proportion. For hoops there is said to be a very respectable call on United States account, one firm in North Staffordshire being alleged to have orders for nearly 3000 tons on its books for your buyers. Iron rails are also among the articles wanted for your markets, and many lots have been sold for that destination. Further transactions are in progress, but it is understood that the recent rise in freights is prejudicial to their ratification. Iron rails, mostly of Welsh manufacture, are currently held at about £5. 7/6 @ £5. 15/ per yard, for equal sections of weights of about 35 to 50 pounds per yard. Inquiries run a good deal on light sections, which makers do not care to touch, while they are enabled to secure commissions for heavier sections, even though they receive somewhat less for the latter. At Gysarthfa there is a fair amount of work in hand, and both Rhymney and Blaenavon may be said to have no particular grounds for complaint. Steel rails are tolerably firm at about late rates—£6. 10/ @ £7 per ton, from which level they are scarcely likely to recede, during the next month or two at all events. The mills are all well engaged, and the order books are pretty well entered forward. From year side there is less pressure, although I heard of several inquiries, chiefly for Western roads. Bessemer blooms are wanted, and remain scarce at about £6. The only lots available are in second hands, and of German make. Old rails are quieter, but are still relatively scarce, at about £4. 5/ @ £4. 10/ c. i. f., United States ports. Flange rails from the Continent are freely offered here at £3. 15/ @ £4, but are said to be of poor quality, and rough to handle or work up. For wrought scrap the inquiry is steadily good, and I hear of one lot of 1200 tons "in a line" being done at £4. 6/ @ £4. 8/ c. i. f., New Orleans. Other scrap, such as old leaf steel, is in moderate request at about late rates.

#### SCOTCH PIG IRON.

is dull and there has been a further relapse in warrants, as well as a drop of 1/ per ton in several brands of makers' iron. Shipments are so much below those for the corresponding period of 1880 that all the speculators are timid, and for that reason, combined with others, are endeavoring to realize. This is no slight matter when it is considered that the outside public own about 375,000 tons of pig iron on warrants. In Connal's official stores there are now 526,111 tons of pig iron, an addition of 2249 tons during the week. At this date last year the quantity was 443,977 tons, and at Christmas, 1880, 495,850 tons. It is thus apparent that the rate of increase during the two months of this year has been abnormally rapid, as compared with the whole of the year 1880. The production now is greater than then, there being now 113 furnaces running on ordinary Scotch pig (besides 7 on hematite), against 111 a year ago. Shipments this year to date have decreased 32,737 tons on a total of 61,382 tons, and the importations from Cleveland into Scotland have also fallen off to the tune of 11,753 tons, on a total of 37,590 tons. The totals are worthy of a moment's consideration as showing the extent to which Scotland uses the pig iron of her nearest and most formidable rival. Ballast pig is

still 45/ per ton, alongside ship. Writing from Glasgow, February 26, Messrs. James Watson & Co. said: "The Scotch iron market has been dull throughout the week, without much change in the price of warrants. The demand for makers' iron is quiet and prices are consequently lower. On Monday a small business was done in warrants between 50/5½ and 50/3, cash. On Tuesday the price rallied from 50/3 to 50/5 per ton. On Wednesday the market receded from 50/5 to 50/2, cash, and yesterday business was done between 50/1 and 50/2½, cash, while to-day it opened firm at 50/3 and 50/4 per ton, afterwards declining to 50/1, and closing buyers at 50, sellers at 50/1 per ton. The shipments last week were 7405 tons, as compared with 15,152 tons for the corresponding week of 1880." We quote:

G. M. B. at Glasgow.....	No. 1.....	No. 3.....
Gartsherrie, at Glasgow.....	59/6	51/6
Cottles, ".....	59/6	51/6
Summerlee, ".....	59/6	51/6
Langloan, ".....	59/6	51/6
Carnbroe, ".....	59/6	51/6
Calder, ".....	59/6	51/6
Glengarnock, at Ardrossan.....	57/	50/
Edinburgh, ".....	51/6	49/
Dalmellington, ".....	51/6	49/
Shotts, at Leith.....	51/6	49/
Kinnell, at Bo'ness.....	50/	47/
Carroll, at Grangemouth.....	50/	47/

Messrs. John E. Swan & Bros. and Messrs. W. Colvin & Co. quote similar figures.

#### CLEVELAND PIG IRON.

is somewhat steadier at the moment, and may not be so forward slowly, but surely, from this date under the influence of the approaching reopening of the shipping season and the expectation of a stronger call from Scotland, where the reserve stocks of Cleveland iron are known to be almost exhausted. Prices for G. M. B., net cash, at makers' wharves in Tees are:

No. 1 Foundry.....	43/	Mottled.....	37/6
" "..... <td>41/ <td>White..... <td>37/</td> </td></td>	41/ <td>White..... <td>37/</td> </td>	White..... <td>37/</td>	37/
" "..... <td>39/ <td>Refined Metal..... <td>54/</td> </td></td>	39/ <td>Refined Metal..... <td>54/</td> </td>	Refined Metal..... <td>54/</td>	54/
" "..... <td>38/6 <td>Kentledge..... <td>49/6</td> </td></td>	38/6 <td>Kentledge..... <td>49/6</td> </td>	Kentledge..... <td>49/6</td>	49/6
Forge..... <td>38/</td> <td></td> <td></td>	38/		

Large quantities of Spanish and Elban ores are again being imported into the Tyne and Tees ports. On a single day last week over 9000 tons were brought into Middlesboro' alone, beside smaller lots into the Hartlepool. These ores are for the steel works and the hematite pig producers.

#### WEST COAST HEMATITES.

are a shade easier, partly owing to the failures alluded to in my last, and in part by reason of some little relaxation of the demand. Current quotations for average lots are as under:

Cleator.....	No. 1.....	No. 2.....	No. 3.....
Lonsdale.....	42/6	40/	37/6
Workington.....	45/	42/	39/
Lowther.....	45/	42/	39/
Hess Bay.....	45/	42/	39/
Hartington.....	45/	42/	39/
Solway.....	45/	42/	39/
Maryport.....	45/	42/	39/
Askham.....	45/	42/	39/

#### AT BIRMINGHAM.

a few of the leading industries are tolerably well engaged, but there is no real activity in any direction. The home market for builders and general ironmongers' hardware is very dull, travelers who are out on their journeys reporting orders almost nil and money difficult to collect. This is especially the case in the purely rural districts, the metropolis and the large towns of the North of England being better in both respects. London orders are better than they had been of late, in all probability owing to the tentative opening of what is known as the season. Spain and her West Indian colonies are buying more freely, and there is more doing with the South American Continent—particularly with Brazil. From Russia, Canada and Egypt, a few good lines have come to hand, but with France, Germany, and Belgium, little, comparatively speaking, is being done, owing to the tariffs which protect the home manufacturers of those countries. From the United States there are orders for guns, bicycles, currys, combs, light brass-foundry, and a few sundries.

#### FROM SHEFFIELD.

and district the news of the week has been sparse and of like moment. The heavy industries are still fairly busy, especially the rail mills. It is stated that Mr. Vanderbilt has placed an order for another lot of 15,000 tons of steel rails with Messrs. Cammell & Co., but no particulars have transpired as regards prices or other points. Brown, Bayley & Dixon being out of the rail trade for the time being, their local competitors may be assumed to have obtained their share of the business and are all well engaged. The company just named have a good order for axles on hand. John Brown & Co. are going on ship and deck plates, beams, engine frames, armor, tires, axles, and general work. Wire is among the odd manufactures which is selling freely. Prices, however, cannot be said to be highly remunerative. The steel houses are doing a moderate turnover for the States and for the home engineering works—these latter being well engaged on export account. For cutlery there is a good call, especially as best qualities are pretty certain to become dearer in the face of the marked rise in the price of ivory. The other light trades are only moderately employed.

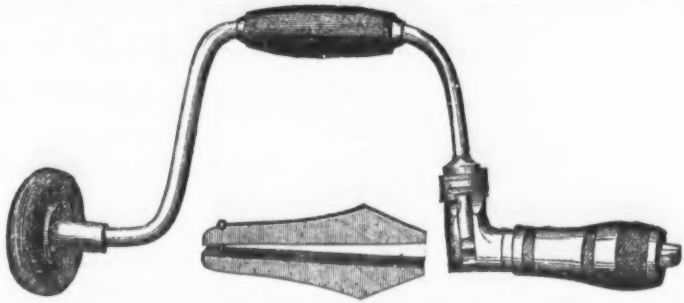
#### ANOTHER TRADE OUTRAGE.

has "occurred" in the vicinity of Sheffield, which was commonly supposed to have quite purged itself from this sort of iniquity. The intended victims were Messrs. Thomas Stainforth & Co., of Hackenthorpe, sickle and scythe manufacturers, one of the oldest firms in the neighborhood. Messrs. Stainforth succeeded in effecting a reduction of their grinders' wages in August last, and their example was promptly followed by the other employers. For this reason the trade union is supposed to have placed a black mark against the name of Messrs. Stainforth, the members of the firm having repeatedly received elegantly phrased threatening letters of late. On Sunday last a train of gunpowder, fuse and other "forcible arguments" were applied to their boiler, but did not explode as per programme, and did relatively little damage. Had all gone off as arranged, the works would have been irretrievably damaged. The police are said to be "on the alert" to discover the offenders, but have found out nothing as yet, nor does past experience warrant the expectation that the real perpetrators will be exposed.



At a recent meeting of the East River bridge trustees, President Murphy reported that the contract for steel required in building the bridge is being carried out satisfactorily.





Though we have occupied this identical space in *The Iron Age* for more than twelve years, and though we have been the leading Bit Brace manufacturers of this country during all that time, we have seldom spoken of it in our advertisement, for the reason that all the leading dealers were supposed to know it. Since we first put

## THE BARBER IMPROVED BIT BRACE

on the market, at least a dozen patent braces have run their race through the stores and junk stores, and are now forgotten. It is true, some of them died violent deaths, but most of them perished from constitutional weakness. We do not offer to meet competition, as no one else can make our Brace, and we have nothing to compete with. Others might if they would make their braces of steel, but it is much more expensive, and no one can tell the difference until the brace is put into use. All of our Nickel-Plated Braces are made of rolled steel, with forged steel jaws, which will never wear out. We formerly made malleable iron jaws, which in time wore out. All such we will now replace with steel for 25 cents per pair. They are all one size and will always fit. Our Ratchet Brace at the present time has no competitor in the market. Dealers who sell other styles of braces will find it to their interest to buy their stock of ratchets from us.

The price of Barber Braces has not been changed for many years, and we do not anticipate any variation in the near future. Thanking our customers for past favors, we now solicit their future orders.

**MILLERS FALLS CO.,**  
74 Chambers Street, New York.

**HEATON & DENCKLA HARDWARE CO.,**  
Hardware Commission Merchants,  
507 Commerce Street, Philadelphia.

E. & G. BROOKE'S "Anchor Brand" Nails, Brads, Spikes, &c.  
MALLORY, WHEELER & CO.'S Door and Pad Locks.  
UNION MANUFACTURING CO.'S Butts.  
AMERICAN SCREW CO.'S Screws.  
D. R. BARTON TOOL CO.'S Edge Tools, &c.  
FRANCE'S Shutter Holders.  
Anti-Window Rattlers, Brass and Nickel-Plated.  
WESTERN FILE CO.'S Cast-Steel Files.  
AMERICAN SHEAR CO.'S Shears and Scissors.  
HP NAIL COMPANY'S Wire, Steel, Iron and Brass Nails and Barbed Nails.  
STEELE & SONS' Wrought Handle Rad Irons.

EXCELSIOR MILLS, Genuine Turkish Emery.  
BROWN & BRO.'S Silver Plated Spoons and Forks.  
GAYLORD MANUFACTURING CO.'S Tilt, Chest and Cupboard Locks.  
AMES' Genuine A Chester Emery.  
COLWELL & COLLINS, NORWAY BOLT CO., Norway Carriage and Tire Bolts.  
PLYMOUTH MILL CO.'S Black and Tinned Iron Rivets.  
AMERICAN MACHINE CO.'S Fluters, &c.  
STUART PETERSON & CO.'S Tinned and Enamelled Ware, &c.

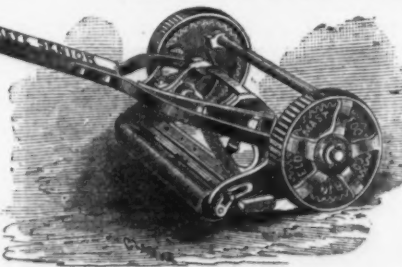
Also a large line of Heavy and Shelf Hardware.

## BUCKEYE LAWN MOWERS.

BEAUTIFUL IN APPEARANCE AND FINISH,  
NOISELESS IN OPERATION AND EASY TO WORK,  
SIMPLE IN CONSTRUCTION, YET  
STRONG AND EFFECTIVE.



The only successful  
LOW PRICED  
LAWN MOWER  
in the market.  
Made in three sizes—  
10, 12 and 14 in. cut.



BUCKEYE SENIOR.  
FIVE SIZES—10, 12, 14, 16, 18 IN. CUT.

### AGENTS.

EVERETT & SMALL, Boston, Mass.  
McINTOSH, GOOD & CO., Cleveland, Ohio.  
BLACK & OWEN, Detroit, Mich.  
F. F. MAST & CO., Philadelphia, Pa.  
FAPPENHEIMER EDW. CO., Cincinnati, Ohio.  
D. E. GOLDENSMITH, San Francisco.  
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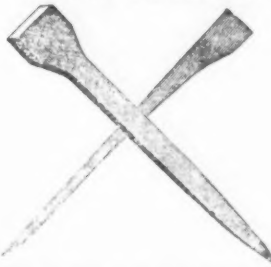
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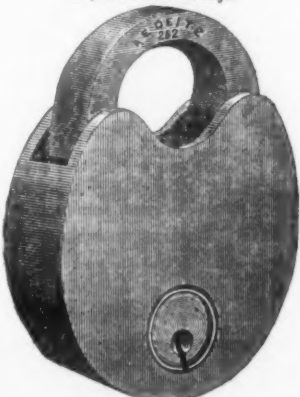
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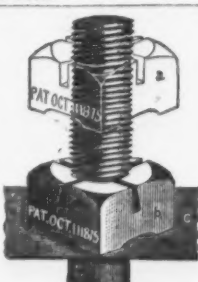
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EVERY MACHINE WARRANTED TO WORK AS REPRESENTED.



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Made of extra quality iron. A practical labor-saving tool. Cuts against the grain equally as well as with it. Can be adjusted instantly to cut a coarse or fine shaving, and excels any double iron plane ever produced.



## No Return of Legal Tenders.

At the Cabinet meeting convened to consider this question all the members were present. Secretary Windom took with him from the Treasury Department a large portfolio filled with statements, copies of letters, &c., pertaining to the request of the National banks relative to the withdrawal of their recent legal tender deposits for the retirement of circulation. The consideration of this subject was very exhaustive, and it was the only business of importance transacted at the meeting. The request made by the National banks was finally decided, and Secretary Windom was authorized to prepare the decision, which was not completed until late in the afternoon. The text of the decision is as follows:

TREASURY DEPARTMENT,  
WASHINGTON March 11, 1881.

*President Merchants' National Bank, Cleveland, Ohio.*—Sir: I am in receipt of your letter of the 5th inst., stating that your bank had, during the previous week, deposited with the Assistant Treasurer at New York \$180,000 in legal tenders, with a view of retiring that amount of its circulating notes, that the bonds to secure the same, amounting to \$200,000, had been forwarded from the Treasury in this city to New York, and that the bank now desires to return them to the Treasurer of the United States and receive back the above amount of legal tender notes. As the action taken in this case would establish a rule by which the Department would necessarily be governed in regard to similar requests from other banks, some delay in answering your letter has occurred.

It seems that since the 19th ultimo about \$19,000,000 of legal tenders have been deposited by banks for a purpose like that mentioned by you. Of this amount about 1,000,000 was returned by the Treasurer, request therefor having been received before any redemption of notes had been made or the security bonds delivered. In such cases, the transaction being incomplete, the Department has clearly a right to return the notes, as has been done. Of the remaining amount, about \$18,000,000, the security bonds therefor have either been surrendered or redemptions against the amounts deposited have already been made, and the transactions have been so far completed that it has been decided that the precedents of the Department in similar cases should be added to, and no return of the legal tenders be made.

In this connection it should be stated that no apprehension of unfavorable results need be entertained in this matter. Since the 25th ultimo the Department has paid out for bonds purchased about \$6,500,000, and is to-day paying out on like account an additional amount of \$5,000,000. In addition to these payments there has been advanced from the Treasury since the 1st inst., to meet the payments of arrearages of pensions, the amount of \$7,583,844.03, and on the 1st proximo there will fall due of interest more than \$7,000,000, and there are on hand of incomplete National bank notes, which can be issued at once to the banks, the amount of \$4,000,000, which, in the aggregate, it will be observed, will take an amount from the Treasury largely in excess of the amount of legal tender notes which has been deposited by the banks since the 19th ultimo, and which it is now desired should be returned.

Letters have also been received asking if the identical United States bonds held as security for circulating notes which were recently withdrawn by the national banks can be deposited without transfer. This request will be granted if the bond bears no assignment except that of the Treasurer of the United States to the bank returning it. Very respectfully,  
H. F. FRENCH,  
Acting Secretary.

The Cleveland Rolling Mill Company, of Cleveland, Ohio, will at an early date begin work at a blast-furnace plant which, it is expected, will equal in its equipment any now in the country. It is to consist of four furnaces, the contract for the erection of the first of which has been made with Messrs. Witherow & Gordon, of Pittsburgh, Pa. Each furnace will have a diameter of 20 feet and a height of 75 feet. The entire plant will require twelve powerful vertical condensing engines, each capable of delivering from 12,000 to 15,000 cubic feet of air per minute. The boilers, in several distinct batteries, will have one-third more surface than required as a reserve for cleaning or accidents. The plant will be supported with twelve Whitwell fire-brick stoves, each of which will be 21 feet in diameter and 60 feet high, and have a heating surface of 29,000 square feet, and will contain 250,000 9-inch fire-brick. It is expected that by using such masses of material the variations of temperature during the two hours' blow will be very small. Each of the blast furnaces will, it is estimated, require from 30,000 to 35,000 cubic feet of heated air per minute, and give a weekly output of 1200 tons. If the blast is maintained at a temperature ranging from 1400° to 1500° F., the consumption of coke is calculated to be not more than 18 cwt., or 2000 pounds per net ton. No. 1 furnace is to be completed by the 1st of September next, and the others will follow in quick succession.

The money-order system of the New York Post Office is looked upon as being nearly perfect. Mr. William Flimley, general superintendent of the department, says that about one-eighth of the entire money-order business of the United States passes through their hands, comprising, for the last year, \$51,000,000 in hard cash. The number of orders issued in the same time was 7,240,537, representing the enormous sum of \$100,352,818, all of which passed through the office in absolute safety. The fees paid to the Post Office Department amounted to \$916,452.

President Gowen expects to be able to retain his control in the management of the Philadelphia and Reading Railroad Company, and to dispose of sufficient bonds in England next month to extricate the road from all its troubles. He is not yet quite sure how the influence of rival roads may be thrown against him.

## SCIENTIFIC AND TECHNICAL.

In the *American Journal of Science and Arts*, Prof. W. P. Blake describes THE OCCURRENCE OF REALGAR AND ORPIMENT IN UTAH TERRITORY.

They occur together in a thin bed or layer in the horizontal sedimentary formations underlying the lava of Coyote Mining District, Iron County, Utah. The formation, with its lava cap, forms the divide between the head waters of the Sevier river and the Colorado drainage, and is known as the "Rim of the Basin." The horizontal beds of stibnite, recently described by Professor J. S. Newberry, occur in the same formation, but chiefly in a sandstone of a different horizon. The arsenical sulphides are found in a compact, sandy clay, in a horizontal seam or layer about two inches thick, not distinctly separated from the clay, but lying in its midst in lenticular and modular masses. The bulk of the layer consists of realgar in divergent, bladed crystals, closely and confusedly aggregated, sometimes forming groups of brilliant crystalline facets in small cavities toward the center of the mass. The orpiment, which is closely associated with the realgar, is in small and delicately fibrous crystalline rosettes, and small spherical aggregations, made up of fine radial crystals, and also, in bright yellow amorphous crusts in and around the mass of the realgar. Above and below the layer, and in close contiguity, there are thin parallel seams of fibrous gypsum. The strata above, for thirty feet or more, are arenaceous clays charged with soluble salts, which exude and effloresce upon the surface of the bank and form hard crusts. The whole appearance and the association of the arsenical sulphides indicate that these sulphides have been formed by aqueous infiltration since the deposition of the beds.

In the *Annales des Mines*, M. A. Carnot gives the following

## ANALYSES OF DIADO CHITE

found in the anthracite mine of Peychagnard, Isère, France, No. 1 being a brown, vitreous variety, while No. 2 was whitish and earthy:

Oxide of iron.....	36.63	36.60
Phosphoric acid.....	16.70	17.17
Arsenic acid.....	0.45	13.68
Sulphuric acid.....	13.37	32.20
Water.....	32.43	0.15
Lime.....	0.30	trace
Magnesia.....	trace	trace
Organic matter.....	trace	trace
Total.....	99.83	99.77
Specific gravity.....	2.22	2.10

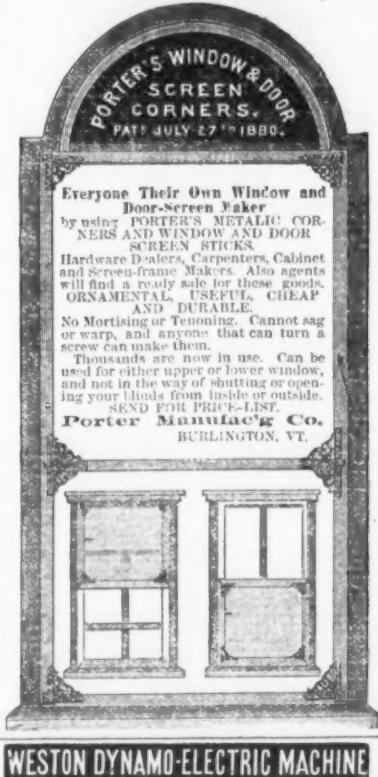
**Employers' Liability.**—The bill introduced into the New York State Senate by Mr. Fowler to define and regulate the liability of employers for personal injuries suffered by their workmen, is a copy of the act passed by the British Parliament last summer after much discussion. It makes an employer liable to his workmen for injuries caused, first, by any defect and to negligence in ways, works or machinery; second, by the negligence of a superintendent or any person whose orders the workman is required to obey; third, by the obedience of any person employed to improper or defective rules or by laws made by the employer; fourth, by the negligence of any one having charge of any signal, points, locomotive or train on a railway. Liability in the case last enumerated is limited to railroad companies. In all other respects the provisions of the measure appear to be general and applicable equally to all employers and employees. It is said that the railroad power will oppose the passage of this bill; for, although, as we have just said, the act is intended to fix the liability of employers generally, yet as a matter of fact it will be likely to bear heavily upon railroad companies than any other class of employers. This is forcibly illustrated by the fact that in nine-tenths of the litigated cases on this subject railroad corporations have appeared as defendants.

**Canadian Duties on Iron Bridge Material.**—A dispatch from Ottawa, says: Clarke, Reeves & Co., of Philadelphia, have been adjudged by the Dominion government to pay a forfeit of \$26,000 on undervaluation of entry in the customs of the iron superstructure of the Chaudiere Railway Bridge, for which they had the contract at \$104,000 from the Quebec government. The firm had already paid \$26,000 in duties; so that, with the fine of a similar amount, they pay to the government \$52,000 in all. The government has fixed \$5.25 per cwt., as the value at which iron bridge material may be sent into the Dominion, and the duty to be paid is 25 per cent. The Philadelphia firm named entered the Chaudiere Bridge superstructure at \$3.50 per hundred.

Rear Admiral Nichols, inspector of the Third Lighthouse District, announces that an automatic buoy having a 10-inch whistle and a glass globe for an electric light on the top, has been moored in 13 fathoms of water nearly south from the Sandy Hook Lightship, and about three cables' length from it. The inventor of this buoy claims that it will show an intermittent electric light, the generator being operated by the action of the waves. The Lighthouse Board has permitted this buoy to be placed where it is, in order that its practical advantages, if any, may be tested, and that its operations may be observed and reported upon by the people on board the lightship. Pilots and navigators are requested to send to Inspector Nichols the result of their observations on this buoy.

W. W. Winchester, son of the late Lieut.-Gov. Oliver F. Winchester, died in New Haven on Monday night, aged 43. He was vice-president of the Winchester Repeating Arms Company, and since his father's death was nominally its head.

The Committee on Streets in the New York Board of Aldermen have a resolution before them compelling telegraph companies to lay their wires underground. Perhaps this is exactly what the telegraph companies want.



WESTON DYNAMO-ELECTRIC MACHINE

## NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

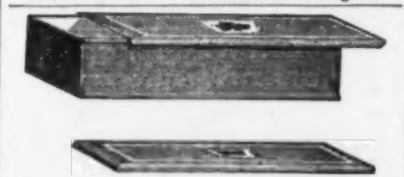
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Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., \$250. We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

**INFRINGEMENTS.** We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

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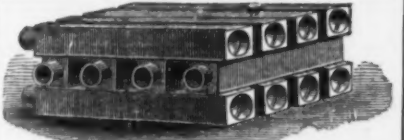
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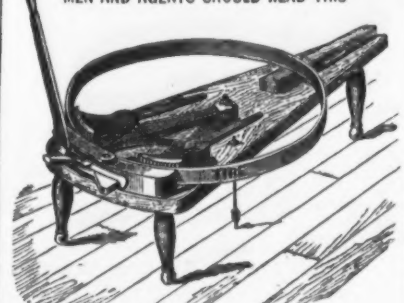
Calvin Pardee & Co. { SUGAR LOAF,

Pardee, Sons & Co. { LATTIMER,

Pardee, Sons & Co. { MT. PLEASANT,

## BLACKSMITHS, HARDWARE

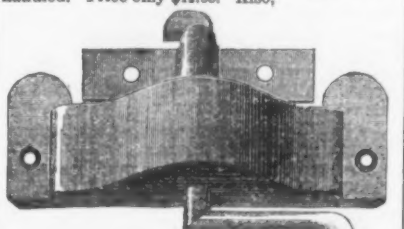
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Machine rivals all others. \$50 cash will be given to two men who can saw as fast and easy in the old way, as one boy 16 years old can with this machine. Warranted. Circulars sent free. Agents wanted.

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# The Iron Age Directory

## and Index to Advertisements.

PAOR.

Agricultural Implements.

Grant Fan Mill and Cradle Co., Melrose, N. Y. 28

Hughes Cultivator Co., Hamilton, O. 28

Air Compressors.

Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y. 40

The Norwalk Iron Works, Norwalk, Conn. 39

Alarm Money Drawers.

Tucker &amp; Dorsey, Indianapolis, Ind. 10

Anti-Friction Metals.

Phila. Smelting Co., 12th and Noble Sts., Phila. 17

Reeves Paul S., Philadelphia, Pa. 17

Avalia, Manufacturers of.

Cheney Anvil &amp; Vise Co., Detroit, Mich. 35

Fisher &amp; Norris, Trenton, N. J. 35

Newlin &amp; Yarnall, Philadelphia, Pa. 35

Asbestos Materials.

The Chalmers-Spence Co., Foot 4th st., E. R., N. Y. 38

Avalia, Manufacturers of.

Cook R. &amp; Sons, Winsted, Conn. 8

Lambertville Iron Works, Lambertville, N. J. 29

Wurster F. W., Brooklyn, N. Y. 40

Babbit Metals.

Phila. Smelting Co., 12th and Noble Sts., Phila. 17

Bing Holders.

Sprengle L. Jeff., Ashland, Ohio. 35

Barb Wire.

Thorn Wire Hedge Co., Chicago, Ill. 6

Bed Screws.

Shelton &amp; Co., Birmingham, Ct. 32

Bellows, Manufacturers of.

Scott Geo. M., Chicago, Ill. 8

Belts (Sleigh).

Sevin Bros. Mfg. Co., Easthampton, Conn. 28

Belt Hooks.

Browning, Slum &amp; Co., 85 Chambers, N. Y. 29

Belting, Makers of.

Alexander Bros., 412 N. 3d, Philadelphia. 35

Forsyth, Wm. &amp; Co., Phila. and 79 Liberty St., N. Y. 13

N. Y. Belting and Tacking Co., 37 Park Row, N. Y. 13

Peck &amp; Bm., Cleveland, O. 26

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Pope Mfg. Co., 65 Summer, Boston. 40

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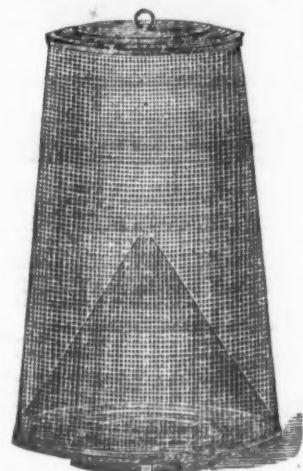
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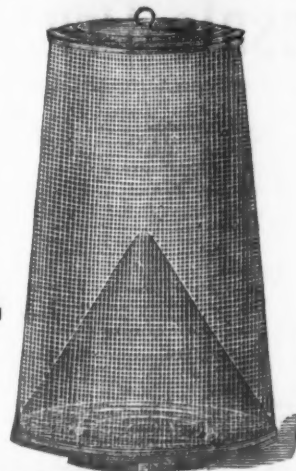
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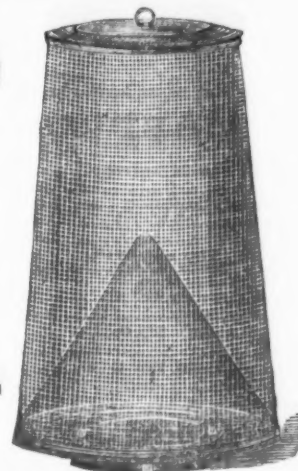
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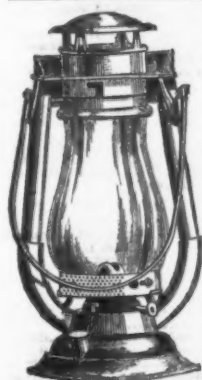
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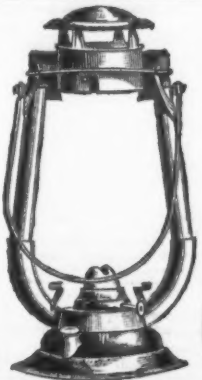


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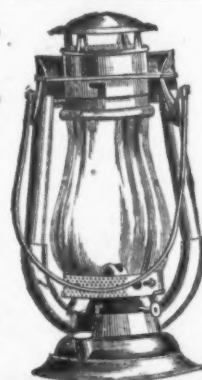


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## SOHO IRON MILLS.

## MOORHEAD &amp; CO.,

MANUFACTURERS OF

GALVANIZED SHEET IRON,

Juniata, Charcoal and Common.

Sheet &amp; Plate Iron,

And Special Sizes for Sap Pans.

PITTSBURGH, - - - - - PENN.

FIRST QUALITY.

SECOND QUALITY



## NOTICE.

Hereafter our GALVANIZED SHEET IRON will be branded as per cuts in margin. We have adopted these



## TRADE MARKS

to protect ourselves and the trade against imitations of our iron, as was the case under our old brands.

THIRD QUALITY

as heretofore.

January 1, 1881.

ELBA IRON &amp; BOLT CO., Limited.

MANUFACTURERS OF

## MERCHANT BAR IRON,

Skelp Iron, Splice Bars, Railway Track Bolts, Car, Bridge, and Machinery Bolts, Nuts, &amp;c.

We invite the attention of RAILROAD MEN especially to our make of SPLICE BARS and Track Bolts. Using the best brands of REFINED IRON, and paying close attention to the finish of our manufactures, we are enabled to offer our patrons BOLTS, NUTS, SPLICE BARS, &amp;c., of excellent quality. Our works have been enlarged within a few years; all orders are now executed with promptness; all our work guaranteed.

SEND FOR PRICE LISTS AND INFORMATION TO

ELBA IRON &amp; BOLT CO., Limited, Pittsburgh, Pa.

## RAILROAD OR CANAL BARROW,

With Jacobs' Patent Wheel.



Full sized, bent tray, planed and well finished. Bolted securely to frame. The legs extend upward, serving as a brace to the bowl, to which they are bolted; they are also bolted to handles. This Barrow has the Jacobs Patent Wheel, superior in every way to any iron wheel manufactured. The wheel revolves on a fixed axle bolt, similar to a buggy wheel. The axle bolt holds the barrow firmly together. The barrow for Railroad Contractors. Will outwear any other made, and displaces all others wherever introduced. Wheel painted.

We also manufacture a full line of

ORE, BRICK, STONE and GARDEN BARROWS.

Also.

Road Scrapers, Road Plows, Levelers, &amp;c.

## REVOLVING SCRAPER CO.,

COLUMBUS, - - - - - OHIO, U. S. A.

## PHILADELPHIA SCREW CO., Limited,

Twelfth and Buttonwood Streets, PHILADELPHIA.

Manufacturers of

## IRON &amp; BRASS WOOD SCREWS.

Quality, finish and tests as to strength guaranteed equal to any in the market.

With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts. A full line in stock.



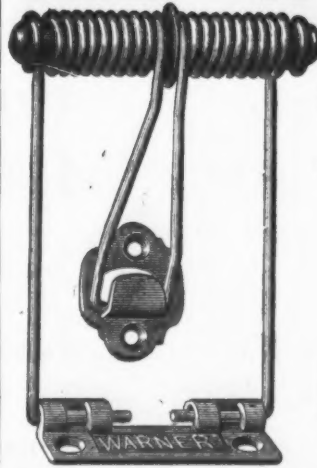
Grindstones.

OHIO GRINDSTONE CO.,

127 Superior Street,

CLEVELAND, OHIO.

## THE "WARNER" DOOR SPRINGS



are the most simple, most effective and most convenient ever introduced, and the immense sale we are having shows their great popularity and superiority.

There never was a Spring made that is so durable, so complete in its action, operating with a uniform pressure, holding the door tight when closed, and allowing it to open without increasing the pressure at any point.

When the door is opened about 130 degrees of a circle, it will press and hold it open.

The Spring is easily unhooked and rehooked—in an instant—from the door and also from the jamb, without removing a screw or pin.

This is a Convenience Possessed by no other Spring in the Market.

We are making this season three sizes, viz:

No. 1 For Screen or Light Storm Doors.

No. 2 For Medium Doors.

No. 3 For Heavy Doors.

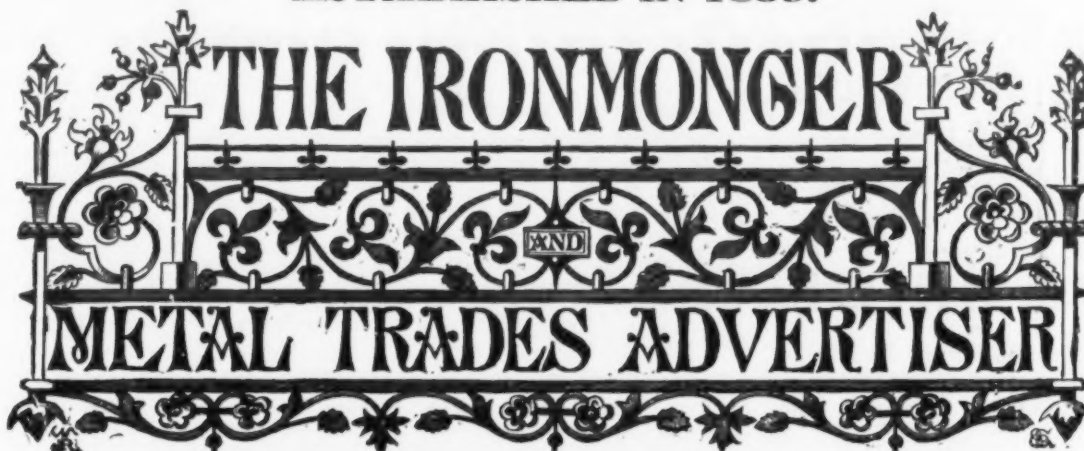
They are for sale by most of the prominent jobbers of the United States and Canada.

Correspondence solicited.

## FREDERIC BARTLETT,

FREEPORT, ILLINOIS.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

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PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS, Manager and Associate Editor.

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## SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The Ironmonger has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the Ironmonger. The Week, Legal News, Trade Notes, Bankruptcies, Foreign Notes, Colonial Jottings, Merchants' Circulars, &amp;c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French and Belgian and other Special Correspondence.

## SUBSCRIPTIONS

to the Ironmonger and Metal Trades' Advertiser, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful Ironmongers' Diary and Text Book, a work sold to non-subscribers at 75 cents.

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## SPECIAL ISSUES.

In the spring and autumn of each year there is published a Special Issue, the circulation of which is not less than Twelve Thousand (12,000) copies.

## THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual presented free to every Subscriber to the IRONMONGER AND METAL TRADES' ADVERTISER. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

## THE FOREIGN SUPPLEMENT

is published every fourth week in connection with the extensive and world-wide circulation of the Ironmonger itself. The dates of its publication for the next twelve months will be as follows:  
APRIL 2 and 30, MAY 28, JUNE 25, JULY 23, AUGUST 20, SEPTEMBER 17, OCTOBER 8, NOVEMBER 6, DECEMBER 3 and 31, JANUARY 28, FEBRUARY 25, 1882.

This Supplement is published in

## FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the Ironmonger not only within reach but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

## THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the Ironmonger and Foreign Supplement is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.



**B. KREISCHER & SONS,**  
**FIRE BRICK.**  
BEST AND CHEAPEST.  
Established 1845.

Office, foot of Houston Street, East River,  
NEW YORK.

**NEWTON & CO.,**

ALBANY, N. Y., Manufacturers of

**FIRE BRICK**  
**Stove Linings,**

**Range and Heater Linings**  
Cylinder Brick, &c., &c.

**M. D. Valentine & Bro**  
Manufacturers of

**FIRE BRICK**  
**And Furnace Blocks**  
DRAIN PIPE & LAND TILE.  
Woodbridge, - - - N. J.

**BORNER & O'BRIEN,**  
Manufacturers

**FIRE BRICK**  
AND

Edge Pressed Furnace Blocks,  
**CLAY RETORTS, TILES, &c.,**  
Twenty-third Street,  
Above Race, PHILADELPHIA.  
Twenty years' practical Experience.

**BROOKLYN**

**Clay Retort and Fire Brick Works,**  
(EDWARD D. WHITE & CO.)  
Manufacturers of Clay Retorts, Fire Brick,  
Gas House and other Tile.

VAN DYKE, EL ZABETH, RICHARDS & PARTITION STS.  
Office, 88 Van Dyke St., Brooklyn, N. Y.

**WATSON FIRE BRICK CO.,**  
ESTABLISHED 1856.  
essors to JOHN R. WATSON, Perth Amboy, New Jersey.  
Manufacturers of

**FIRE BRICK,**  
or Rolling Mills, Blast Furnaces, Foundries,  
Gas Works, Lime Kilns, Tanneries, Boiler  
and Grate Setting, Glass Works, &c.  
Fire Clays, Fire Sand, and Kaolin for Sale.

**HENRY MAURER,**  
Proprietor of the  
**Excelsior Fire Brick & Clay**  
**Retort Works,**  
Manufacturer of FIRE BRICK, HOLLOW  
BRICK AND CLAY RETORTS.  
WORKS: PERTH AMBOY, NEW JERSEY.  
Office & Depot, 418 to 422 East 23d St., N. Y.

**TROY FIRE BRICK WORKS,**  
Troy, N. Y.,  
**JAMES OSTERLANDER & SON,**  
ESTABLISHED 1846.  
Manufacturers of  
**FIRE BRICK,**  
Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and  
Dealers in Woodbridge Fire Clay and Sand, and Staten  
Island Kaolin.

Established 1864.  
**GARDNER BROTHERS,**  
Manufacturers of  
**STANDARD SAVAGE FIRE BRICK,**  
**TILE & FURNACE BLOCKS,**  
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and  
Miners and Shippers of Fire Clay.  
Office: 115 Smithfield St., Pittsburgh, Pa.  
Works: Mt. Savage Junction, Md., and Lockport, Pa.

**HALL & SONS,**  
**FIRE BRICK,**

Buffalo, N. Y.  
**MILLER'S BRICK PRESSES**  
(Established 1844).  
**FIRE and RED BRICK,**  
And Brickmakers' Tools in General.  
**SAML. P. MILLER & SON,**  
309 South 5th St., Philadelphia.

**The Morris Sash Lock Mfg. Co.,**  
Manufacturers of  
**The Morris Sash Lock,**  
Pat. Combined Sash Lift & Lock,  
Pat. Self-Locking Shutter Bar,  
And specialties in Builders' Hardware.  
214 and 216 ELM STREET, CINCINNATI, OHIO, U. S. A.

**William H. Ainet,** Chairman.  
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**Mellert Foundry & Machine Co.,**  
Limited.  
(Works Established at Reading, Pa., in 1848.)  
Manufacturers of

**CAST-IRON WATER PIPES**  
Specials: Flange Pipe, Retorts, Valves and Hydrants,  
Lump Posts, &c. The Improved Canadian Tur-  
bine Water Wheel, Machinery and Castings  
for Furnaces, Rolling Mills, Grist and Saw Mills, Min-  
ing Pumps, Hoists, &c. Columns, Brackets, Iron  
Railroad Cars, &c.  
**LEONARD MELLERT, Supr., Reading, Pa.**

# HENRY DISSTON & SONS,

**KEYSTONE SAW, TOOL, STEEL & FILE WORKS,**  
Front and Laurel Streets, PHILADELPHIA.

**DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER,**

Fig. 1.

Patented May 29, 1870.

Price, - - - \$37.50 per dozen.

No Farmer, Nurseryman, Railroad  
or Telegraph Company  
**SHOULD BE WITHOUT ONE.**

**NO BACK-ACHE.**

**NO KNEE-WORK.**

**NO CLOGGING.**

This tool has been thoroughly tested, and has given  
the greatest satisfaction to all who have tried it. The  
principle on which it works makes it self-cleaning and  
prevents adhesion in sticky soil; therefore it always  
works free and easy. It is far superior to all plungers,  
augers and boring machines, as it works well in stony,  
sandy, or clay soils; quicksand under water is as easily  
removed as though no water existed.

**DIRECTIONS.**

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as  
shown in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with  
one hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by  
simply pressing down the lever, which will open the blades, and the dirt will fall from between them. The Digger is then ready for  
another plunge. The steel blades are nine inches long, and the whole tool five feet long. For Sale at Hardware and Agricultural Stores.

**HENRY DISSTON & SONS.**



WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man Saw.  
We make the following lengths, 3½, 4, 4½, 5 feet. Send for sample.

**WHEELER, MADDEN & CLEMSON MFG. CO., Middletown, N. Y.**

**AMERICAN BOLT CO., Lowell, Mass.,**  
MANUFACTURERS OF

**Bolts, Nuts, Washers, Chain Links, Car**  
**Bolts, Bridge Bolts, Lag Screws, &c.**

**IRON, BRASS AND GERMAN SILVER**  
**FRENCH NAILS, ESCUTCHEON PINS, SMALL RIVETS & SCREWS,**  
And Specialties in this line made to order by  
**BLAKE & JOHNSON,**  
WATERBURY, CONN.

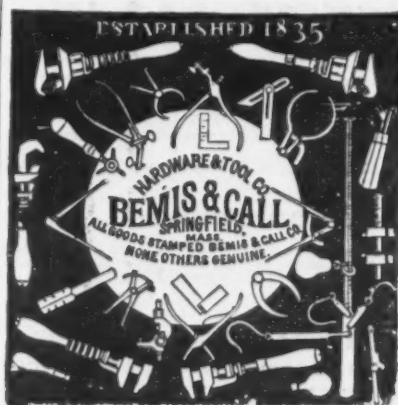
**NEWTON'S PATENT STEAM TRAP AND GRATE BARS,**

MANUFACTURED BY

**PROVIDENCE STEAM TRAP CO., Providence, R. I.**

See The Iron Age first issue of each month.

Agents Wanted for Different Locations.



**NEW MAKE OF MINE LAMP.**  
THREE DIFFERENT SIZES  
SEND 15 CENTS FOR SAMPLE TO  
LEONARD BROS., Scranton, Pa.

**WILLIAM. McNIECE,**  
SAW MANUFACTURER.  
515 CHERRY ST PHILA. PA.



**HUNDLEY & HANKS,**  
PROPRIETORS OF  
**NORTH CAROLINA HANDLE CO.**



MANUFACTURERS OF  
**Handles and Spokes,**  
79 Rensselaer Street and 97 Chambers Street,  
HARDWARE COMMISSION MERCHANTS, NEW YORK.

**John T. Lewis & Bros.**  
No. 231 South Front St.,  
PHILADELPHIA.



TRADE MARK.  
MANUFACTURERS OF  
Pure White Lead, Red Lead, Litharge,  
Orange Mineral, Linseed Oil,  
AND PAINTERS' COLORS.

**Brooklyn White Lead Co.**



TRADE MARK  
**White Lead, Red Lead & Litharge.**  
No. 182 Front Street,  
NEW YORK.

**JOHN JEWETT & SONS,**  
Manufacturers of the well-known brand of  
**WHITE LEAD.**



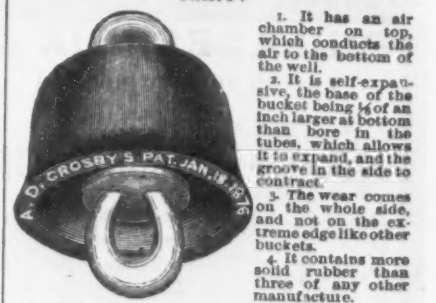
TRADE MARK  
ALSO MANUFACTURERS OF  
**LINSEED OIL.**  
182 Front Street, NEW YORK.



TRADE MARK.  
**The Atlantic White Lead and Linseed Oil Co.,**  
MANUFACTURERS OF  
**White Lead (Atlantic), Red Lead,**  
**Litharge & Linseed Oil.**  
**ROBERT COLGATE & CO.,**  
287 Pearl Street, New York.

The Most Durable and Best Selling  
**Bucket for Chain Pumps.**

It has no valves to become obstructed and no  
screw joints to become immovable by rust.  
Advantages of the Crosby Bucket over all  
others:



Send for Price List. Agents wanted in every  
county. Address  
**A. D. CROSBY, Patentee and General Agent,**  
Cuba, Allegheny Co., New York.

**THOMAS MORTON,**

Manufacturer of  
**CABLE, COPPER, IRON AND STEEL SASH CHAINS,**  
for suspending window shades. Also, Copper Cham-  
pion Chains, with patent attachments, for same pur-  
pose. Agents wanted in the principal cities in the  
United States. Apply at  
95 Elizabeth Street, New York.







# BEECHER & PECK,

Successors to Milo Peck, Manufacturers of

## PECK'S DROP PRESS



PECK'S DROP LIFTER is the only one which has its parts cushioned. Being thus cushioned they are the most durable Lifter in the market.

Can be attached to any drop now in use.

Our New Illustrated Catalogue is just out.

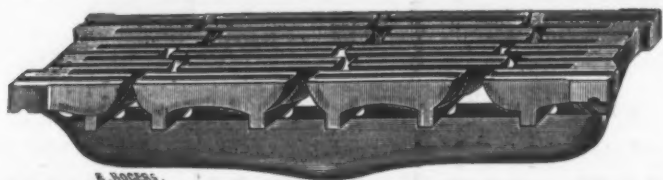
158 Temple Street, New Haven, Conn.

DAVID S. CRESWELL,

816 Race Street, PHILADELPHIA, PA.,

Manufacturer of

W. C. WREN'S PATENT GRATE BAR.



This Grate Bar consists of short parallel bars for carrying the coal, mounted above a long supporting bar, extending across the furnace by short transverse plates, holding the short bars, which retain the heat so far above the supporting bar that it is kept comparatively cool, and is not, therefore, liable to warp, bend or burn. The bars which are subject to the heat, being made in short sections, do not strain the supporting bar. The short bars break joints at the meeting ends to prevent a straight open space across the whole; also to guide the rake used by firemen in cleaning the furnace better than they otherwise would.

We therefore claim the following advantages over other grate bars offered for sale:

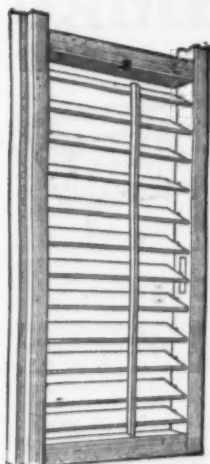
1. Great saving in fuel.
2. Such construction as will equalize all strain resulting from expansion and contraction, thus avoiding warping, and thereby insuring long service.
3. Thorough combustion of fuel, owing to the large air spaces exposed.
4. Bars will not weigh more in proportion than the ordinary bar, and in addition to a saving of 25 per cent. in fuel, will last much longer than any other bar in use.

The WREN GRATE BAR is in use at the works of the Atlantic Refining Co. and other prominent concerns.

# BENTLEY'S Perfect Blind Slat Holder.

Patented.

SUPERIOR TO ALL OTHERS.



For tightening the Slats of Window Blinds and holding them at any required angle.

The sunlight is let in or shut out at will. The blinds are made a much better protection from cold, because when the slats are shut they are so kept by the Holder and cannot be moved by the action of the wind.

Noisy rattling of the slats is prevented. The holder is securely held by its spring and the sharp points at each end.

As it is made of brass it will not rust. It cannot get out of order.

Its superiority over other holders is evident.

It requires no screws or nails to fasten it to the blind. Any one can apply it.

It cannot get loose or deface the blind as others do.

Retail Price, 5 cents each; 50 cents per dozen;

At which price samples will be mailed postpaid.

Trade Price, \$6 per gross; Discount 50 per cent.

FOR SALE BY THE TRADE.

In case your jobbing house cannot supply you, orders will be promptly filled by

R. W. BENTLEY, Sole Manufacturer,  
41 FOURTH ST., BROOKLYN, E. D., N. Y.

# RIPLEY & KIMBALL,

Nos. 907, 909 & 911 N. Main St., ST. LOUIS.

IRON & STEEL BOILER PLATES & SHEETS.

Brass and Iron Fittings for Steam.

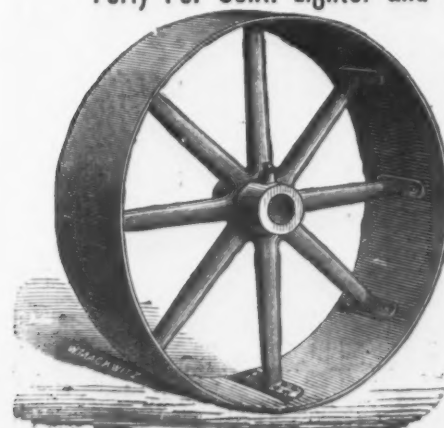
Lap-Welded Pipe & Boiler Tubes

RAILWAY AND BOILER MAKERS' SUPPLIES.

AGENCY NATIONAL TUBE WORKS CO.

# THE MEDART PATENT WROUGHT RIM PULLEY.

Forty Per Cent. Lighter and 100 Per Cent. Stronger



than any cast pulley. No shrinkage strains; perfectly balanced for high speeds; better surface for belt, and

The Cheapest Pulley in the Market.

We make these Pulleys from 10 inches to 10 feet diameter, any face, crowning or straight, split or whole, single or double arms.

Large Pulleys a Specialty. Send for price list.

The Hartford Engineering Co.,  
HARTFORD, CONN.

Sole licensed manufacturers for the New England, Middle and Atlantic Coast States. Also Shafting, Hangers and Couplings.

# L.M. RUMSEY MFG. CO.

MANUFACTURERS & JOBBERS OF

PUMPS & IRON WORKING MACHINERY,

LEAD PIPE &  
SHEET LEAD

PLUMBERS &  
STEAM FITTERS  
BRASS GOODS

BARBED  
WIRE FENCING  
& FENCE WIRE



GAS PIPE &  
FITTINGS

BELTING  
HOSE  
PACKING

PUMP  
CHAIN &c.

RAILWAY SUPPLIES  
No. 804 TO 820 N. SECOND ST.  
ST. LOUIS, MO.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark, also "Riverlin Works."

The Farrel Foundry and Machine Co.

ANSONIA, CONN.

Manufacture Improved

ROCK & ORE

BREAKERS,

(THE "BLACK" STYLE),

designed for breaking to small

pieces and one-third dust all kinds

of hard and brittle substances, such

as Quartz, Emery, Gold and

Silver Ores, Coal, Plaster,

Iron, Copper and Lead Ores, also

Stone for making Concrete

and Railroad Ballast.

Twenty years of practical test, at Home and Abroad, has proven this machine to be the best one

ever invented for the purpose. Mr. S. L. MARSH, for the past fifteen years connected with the manufacture

of these machines, has charge of this department of our works, and will personally superintend their erection

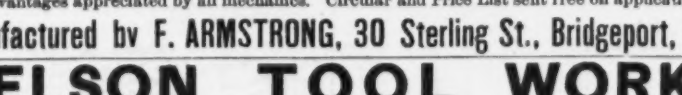
within a reasonable circuit. Chilled Rolls and Rolling Mill Machinery, Power Presses, single

and double acting; also, Hammers, Drops and Lifters; Shafting, Pulleys and Hangers.

COPELAND & BACON, General Agents, 85 Liberty St., New York.

Armstrong's Improved Adjustable Stock and Dies

FOR PIPE AND BOLTS.



Tapped to the U. S. and Whitworth Standard Gauges. Adjustable to all variations in the size of

fittings. Can be resharpened without drawing the temper by simply grinding them. Possessing practical

advantages appreciated by all mechanics. Circular and Price List sent free on application.

Manufactured by F. ARMSTRONG, 30 Sterling St., Bridgeport, Conn.

NELSON TOOL WORKS,

Nos. 665 and 667 First Ave., cor. Thirty-eighth St., New York,

MANUFACTURERS OF

Railroad, Mining, Quarry, Paving, Slaters', Blacksmiths', Boiler Makers' and Horseshoers' TOOLS.

STATIONARY AND PORTABLE

STEAM ENGINES,

Shafting, Hangers, Pulleys and Gearing.

SAW MILLS,

Hoisting Engines and Mining Machinery.

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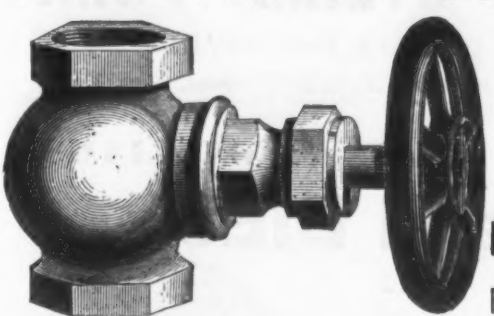
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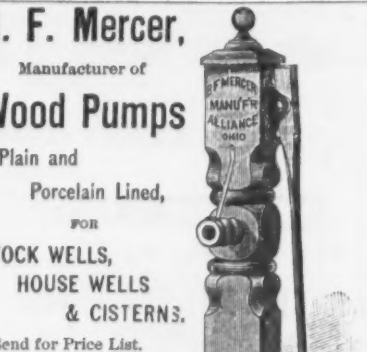
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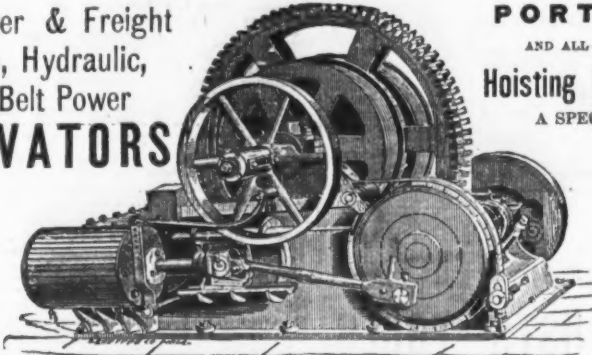
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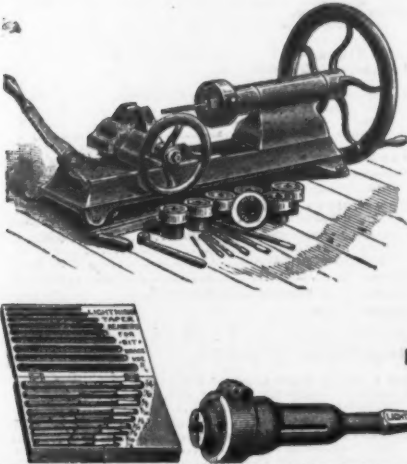


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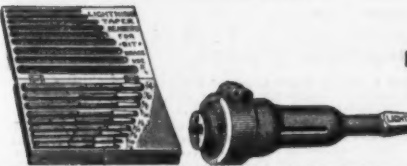
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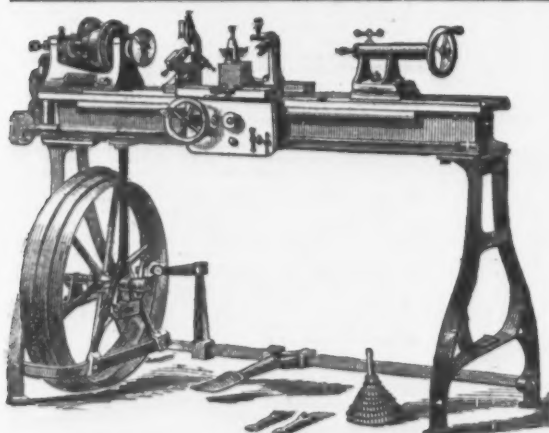
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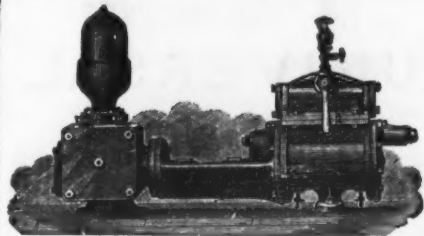


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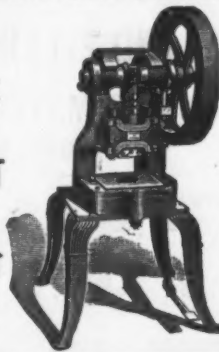
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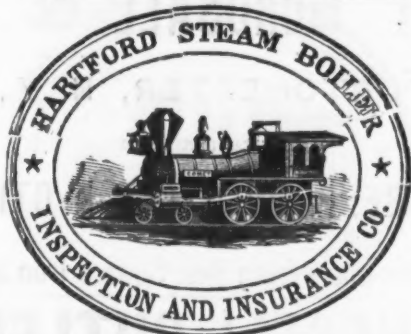
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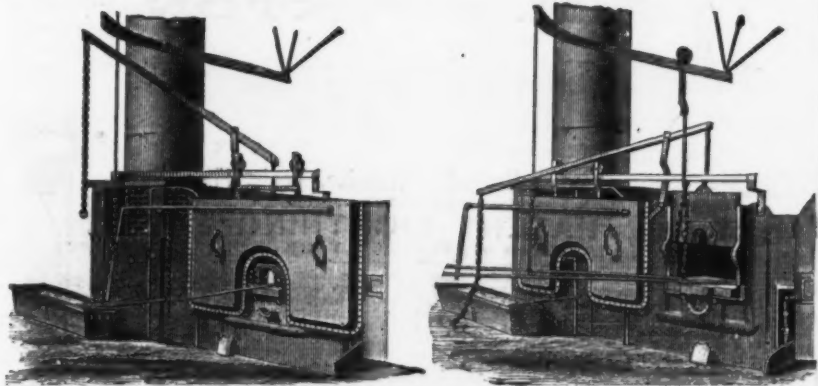
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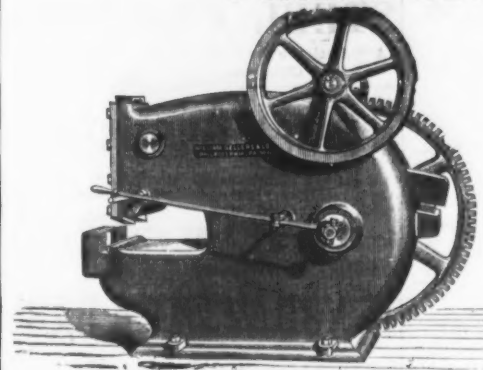
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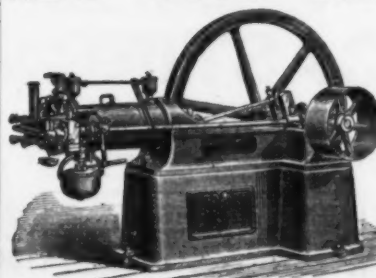
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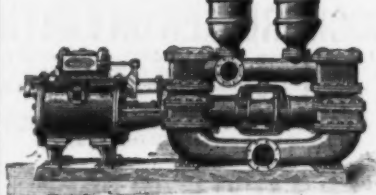


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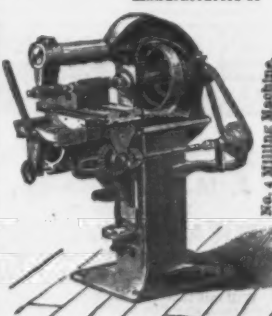
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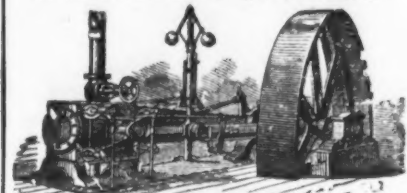
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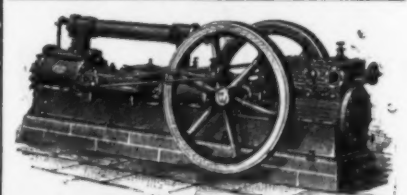
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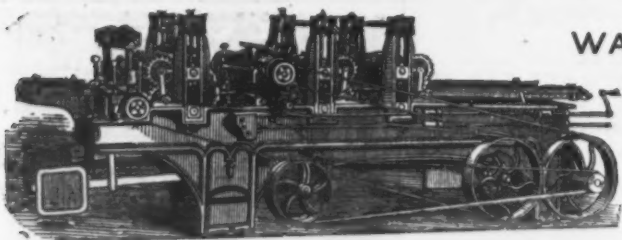
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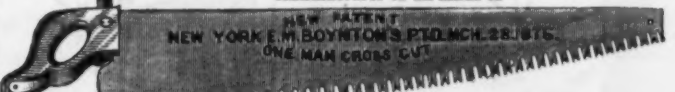
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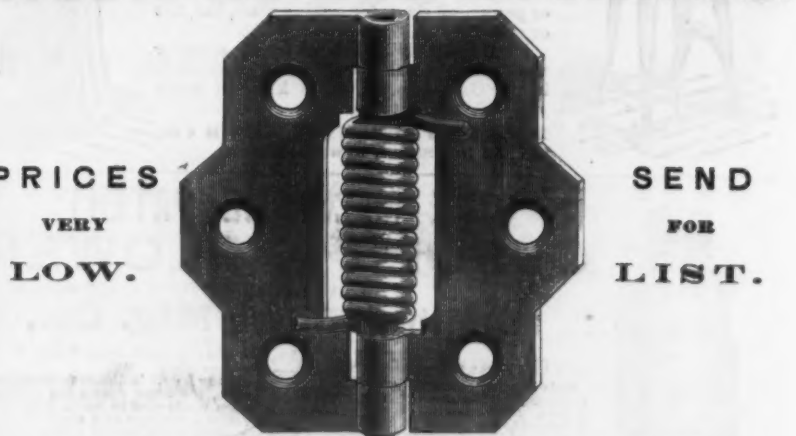
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